

Mathematics for Practical Applications - Baseball - Test File - Spring 2009

Exam #1

In exercises #1 - 5, a statement is given. For each exercise, identify one **AND ONLY ONE** of our fallacies that is exhibited in that statement. **GIVE A DETAILED EXPLANATION TO JUSTIFY YOUR CHOICE.**

- 1.) "According to Joe Shlabotnik, the manager of the Waxahachie Walnuts, you should never call a hit and run play in the bottom of the ninth inning."
- 2.) "Are you going to major in history or are you going to major in mathematics?"
- 3.) "Bubba Sue is from Alabama. All girls from Alabama have two word first names."
- 4.) "Gosh, officer, I know I made an illegal left turn, but please don't give me a ticket. I've had a hard day, and I was just trying to get over to my aged mother's hospital room, and spend a few minutes with her before I report to my second full-time minimum-wage job, which I have to have as the sole support of my thirty-seven children and the nineteen members of my extended family who depend on me for food and shelter."
- 5.) "Former major league pitcher Ross Grimsley, nicknamed "Scuzz," would not wash or change any part of his uniform as long as the team was winning, believing that washing or changing anything would jinx the team."
- 6.) The part of a major league infield that is inside the bases is a square that is 90 feet on each side. What is its area in square centimeters? **You must show the use of units and conversion factors.**
- 7.) CC Sabathia, the 311 pound pitcher, recently signed a contract with the New York Yankees for \$161 million. Convert his weight to centigrams and the contract amount to Mexican pesos. **You must show the use of units and conversion factors.**
- 8.) Methusaleh was 969 years old when he died. How many seconds old was Methusaleh when he died? **You must show the use of units and conversion factors.**
- 9.) The carpet you want to buy costs \$18.95 per square yard. If you are going to be carpeting a room that is 18 feet long and 15 feet wide, how much will it cost to carpet the room? **You must show the use of units and conversion factors.**
- 10.) On September 10, 1960, Mickey Mantle hit a home run against Paul Foytack that cleared the right-field roof at Tiger Stadium. Based on where it was found, it was later estimated to have traveled 643 feet. How many millimeters did the ball travel? **You must show the use of units and conversion factors.**
- 11.) A person is interested in finding out the average income of people in Arkansas. In order to do that, he does a survey by asking the annual income of Arkansas residents in line at the Reddie Café in the Garrison Center. Are his results likely to be representative of Arkansas? Why or why not?
- 12.) CNN is doing a poll on their web site. Explain why this poll is biased.
- 13.) For each of the following, tell whether it is an example of a qualitative statistic or a quantitative statistic.

- a.) per capita income of people working in Mexico, Missouri
 - b.) number of base hits a ball player gets with men on base
 - c.) classification (freshman, sophomore, etc.) of students at Henderson State University
 - d.) percentage of freshmen students at Henderson State University who come back for their sophomore year
 - e.) reasons why freshmen did not come back for their sophomore year
- 14.) Name five different rule changes that we discussed from chapters 1-3 of Schwarz's book.
- 15.) Matching - For each item in Column B, place in the blank the number of the associated name from Column A. Note that there are more choices in Column A than in Column B. No answer should be used more than once.

Column A

Column B

- | | |
|------------------------------------|--|
| 1.) Alan Roth | "The Father of Baseball" |
| 2.) Henry Chadwick | began collecting players' lifetime statistics that were not available anywhere, eventually publishing a book, <u>Who's Who in Baseball</u> , in 1912 |
| 3.) Babe Ruth | began working for his uncles at The Sporting News, then as baseball editor at the New York Press |
| 4.) 1884 Troy Trojans | founded "The Sporting News" (TSN) in 1886 - became known as "The Bible of Baseball" |
| 5.) F.C. Lane | hired the first full-time statistician |
| 6.) Hy Turkin and SC Thompson | National League secretary and statistics fanatic, particularly pitching statistics |
| 7.) Branch Rickey | put together the most in depth and complete statistical compilation to that day, producing the <u>Official Encyclopedia of Baseball</u> in 1951 |
| 8.) Bill Veeck | sought ways to make accumulation of statistics more accurate, started selling statistical reports to newspapers, particularly leader reports. |
| 9.) John Lawres | star pitcher, manager, helped form National League in 1876, started sporting goods company |
| 10.) Art Richmond | the appeal of his home runs led baseball to try to help increase power hitting |
| 11.) Ernie Lanigan | the first openly professional team |
| 12.) Richie Ashburn | was hired as first full-time statistician |
| 13.) John Heydler | |
| 14.) 1869 Cincinnati Red Stockings | |
| 15.) Al and Walter Elias | |
| 16.) Alfred & Charles Spink | |
| 17.) Albert Spalding | |

Exam #2

- 1.) A coat that Mary wanted was priced at \$344. She didn't want to pay that much. It was discounted 30%. She still didn't want to pay that much. A week later, after it was discounted another 20%, she bought it. How much did Mary pay for the coat? (Show all necessary work.)
- 2.) Bob bought a jacket on sale for \$170.85. The jacket had been discounted 15%. What was the original price? (Show all necessary work.)
- 3.) Bob Caruthers pitched 445 innings for the Brooklyn Bridegrooms in 1889. The Bridegrooms' pitching staff had a total of 1212 innings pitched. What percentage of the total innings were pitched by Caruthers?

For each of the following sets of statistics, fill in the blanks.

- 4.) 1941 Ted Williams, Boston Red Sox

AB	H	2B	3B	HR	BB	AV	HBP	SF	TB	SL	OB	OPS
45	18	33	3	37	14		3	0				

- 5.) 1915 Pete Alexander, Philadelphia Phillies

W	L	PCT	IP	H	ER	BB	SO	ERA	SO/IP	WHIP
31	10		376	253	51	64	241			

- 6.) Give a two or three sentence response to each of these statistical situations.
 - a.) In 1937, Ernie Lombardi, catcher for the Cincinnati Reds, had 123 hits. Augie Galan, outfielder for the Chicago Cubs, had 154 hits. Explain why this does not necessarily mean that Galan was a better hitter.
 - b.) Also in 1937, Bob Johnson, outfielder for the Philadelphia Athletics, had a batting average of .306. Heinie Manush, outfielder for the Brooklyn Dodgers, had a batting average of .333. They had approximately the same number of at bats. Explain why this does not necessarily mean that Manush was a better hitter.
- 7.) Fill in the blanks in the tables.

2001, HSU Volleyball

	Games played	Kills	Attack Errors	Total Attacks (Hits)	Kills per Game	Kill Percentage
Lucy Arroyo	139	919	223	2165		

1975-1976, Julius Erving, American Basketball Association, New York Nets

games	free throws made	free throws attempted	free throw %	rebounds	rebounds per game	points	points per game
84	530	662		925		2462	

1970, Bob Hayes, National Football League, Dallas Cowboys

Games	Receptions	Receiving		Attempts	Rushing	
		Yards	Yards per Reception		Yards	Yards per attempt
13	34	889		4	34	

- 8.) The following data are the numbers of home runs hit by Zeke Bonura each year of his major league career. Draw a bar graph to illustrate the data.

YEAR	HR
1934	27
1935	21
1936	12
1937	19
1938	22
1939	11
1940	7

- 9.) In 1988, the New York Mets hit 152 home runs as a team. The following chart shows the distribution of home runs broken down by home runs hit by Lenny Dykstra, Mookie Wilson, Kevin Elster, Gary Carter, Keith Hernandez, Howard Johnson, Kevin McReynolds, Darryl Strawberry and "other" players.

- The portion of the pie for Darryl Strawberry has an angle of 92.36842° . How many home runs did he hit?
- Three players hit more than 20 home runs. Who were they?
- How many home runs did Wally Backman hit?
- Who hit more home runs, Kevin McReynolds or Keith Hernandez?

10.) The following chart gives some of Babe Ruth's career statistics.

Team	G	AB	R	H	2B	3B	HR	RBI	AVG	OBP	SLG
1914 Red Sox	5	10	1	2	1	0	0	2	.200	.200	.300
1915 Red Sox	42	92	16	29	10	1	4	21	.315	.376	.576
1916 Red Sox	67	136	18	37	5	3	3	15	.272	.322	.419
1917 Red Sox	52	123	14	40	6	3	2	12	.325	.385	.472
1918 Red Sox	95	317	50	95	26	11	11	66	.300	.411	.555
1919 Red Sox	130	432	103	139	34	12	29	114	.322	.456	.657
1920 Yankees	142	458	158	172	36	9	54	137	.376	.532	.847
1921 Yankees	152	540	177	204	44	16	59	171	.378	.512	.846
1922 Yankees	110	406	94	128	24	8	35	99	.315	.434	.672
1923 Yankees	152	522	151	205	45	13	41	131	.393	.545	.764
1924 Yankees	153	529	143	200	39	7	46	121	.378	.513	.739
1925 Yankees	98	359	61	104	12	2	25	66	.290	.393	.543
1926 Yankees	152	495	139	184	30	5	47	146	.372	.516	.737
1927 Yankees	151	540	158	192	29	8	60	164	.356	.486	.772
1928 Yankees	154	536	163	173	29	8	54	142	.323	.463	.709
1929 Yankees	135	499	121	172	26	6	46	154	.345	.430	.697
1930 Yankees	145	518	150	186	28	9	49	153	.359	.493	.732
1931 Yankees	145	534	149	199	31	3	46	163	.373	.495	.700
1932 Yankees	133	457	120	156	13	5	41	137	.341	.489	.661
1933 Yankees	137	459	97	138	21	3	34	103	.301	.442	.582
1934 Yankees	125	365	78	105	17	4	22	84	.288	.448	.537
1935 Braves	28	72	13	13	0	0	6	12	.181	.359	.431
TOTAL	2,503	8,399	2,174	2,873	506	136	714	2,213	.342	.474	.690

- a.) In how many seasons did Ruth hit at least 40 home runs (denoted HR)?
 - b.) What was Ruth's highest batting average (denoted AVG)?
 - c.) How many times did Ruth get MORE than 200 hits (denoted H)?
 - d.) In which seasons did Ruth have more than 160 runs batted in (denoted RBI)?
- 11.) The following chart shows the number of doubles (denoted by diamonds), triples (denoted by triangles) and home runs (denoted by squares) for Willie Mays (the greatest all-around player in history) in each year of his career. [Note: the quantity is represented by the middle of the shape.]

- a.) How many doubles did Mays hit in 1966?

- b.) In what year did Mays hit the most triples?
 c.) How many triples did Mays hit the year he hit the most?
 d.) How many times did Mays have more doubles than home runs?
 e.) How many times did Mays exceed 30 in both doubles AND home runs?
 f.) How many times did Mays have at least 10 triples?
 g.) What is the most consecutive years Mays hit at least 30 home runs?
 h.) Did Mays ever have a season when he had at least 20 of each kind of hit?
- 12.) The following data are the number of doubles for Bob "Death to Flying Things" Ferguson from 1873 through 1878. **WITHOUT USING YOUR CALCULATOR AT ALL**, find the following. **BE SURE TO SHOW ALL WORK FOR FINDING THE ANSWERS.**

- | | | | | | | |
|----------|---|------------|----|---|----------|----|
| | 3 | 4 | 10 | 8 | 7 | 10 |
| a.) mean | | b.) median | | | c.) mode | |
- 13.) The following are the major league leaders in Innings Pitched from 1962.

Art Mahaffey	274	Jim Bunning	258
Bill Monbouquette	235	Jim Kaat	269
Billy O'Dell	281	Jim O'Toole	252
Bob Friend	262	Joey Jay	273
Bob Gibson	234	Johnny Podres	255
Bob Purkey	288	Juan Marichal	263
Camilo Pascual	258	Larry Jackson	252
Dick Donovan	251	Ralph Terry	299
Don Drysdale	314	Ray Herbert	237
Ed Rakow	235	Turk Farrell	242
Gene Conley	242	Warren Spahn	269
Jack Kralick	243	Whitey Ford	258
Jack Sanford	265		

Find the following: (You may use your calculator)

- a.) mean b.) median c.) mode
 d.) five number summary:
 minimum, lower quartile, median, upper quartile, maximum
- 14.) Matching - For each item in Column B, place in the blank the number of the associated name from Column A. No answer should be used more than once.

- | Column A | Column B |
|-----------------|--|
| 1.) Bill James | After he stopped working for the Astros, he joined with Dick Cramer to form STATS, Inc. Unfortunately, Cramer and Matt Levine, a marketing expert, pushed him out just as the company got going. |
| 2.) Bob Davids | He, along with 15 other men, met in Cooperstown, home of the Baseball Hall of Fame, and founded the Society for American Baseball Research. |
| 3.) Dan Okrent | He, together with John Thorn, wrote <u>The Hidden Game of Baseball</u> , a new, more accurate statistical compilation. It also introduced new statistical methods for determining |

- player performance. It was not a comprehensive statistical book but in 1989 they published Total Baseball, which was.
- 4.) Earl Weaver In 1964, he published the book Percentage Baseball, which caused many people in baseball to start paying attention to detailed statistical analysis.
 - 5.) Earnshaw Cook In 1977, he published his first Abstract, giving statistics along with analysis and commentary. According to Schwarz, he did more than anyone else to popularize the study of baseball statistics and analysis.
 - 6.) Lee Allen In the 1980s, fantasy baseball, which had been around for a while, became popular due to his influence.
 - 7.) Pete Palmer The main force behind the Elias Sports Bureau, he began doing a painstaking job of carefully checking accuracy of all game, season and career statistics for current players.
 - 8.) Seymour Siwoff The manager of the Baltimore Orioles, he was one of the first managers to rely heavily on statistics for making decisions during games. He would keep statistical notes on index cards that he would go through during games.
 - 9.) Steve Boros This manager of the Athletics was the first manager to make use of a computer.
 - 10.) Steve Mann Was the preeminent baseball historian of the era of the 20th century

Exam #3

- 1.) In 1897, all three outfielders for the Phillies batted at least .400. Billy Hamilton hit .404 and Sam Thompson and Ed Delahanty each hit .407. We will view their batting averages as probabilities, assume that all at bats are independent events and ignore walks, etc.
 - a.) Assume that the three bat right after each other in one inning. What is the probability that all three get hits?
 - b.) Assume that the three bat right after each other in one inning. What is the probability that all three make outs?
 - c.) Assume that the three bat right after each other in one inning. What is the probability that Hamilton gets a hit but Thompson and Delahanty make outs?
 - d.) If Delahanty has two at bats, what is the probability that he gets hits both times?
 - e.) If Hamilton bats six times, what is the probability he gets at least one hit?
 - f.) If Delahanty and Hamilton bat, what is the probability that one, but not both, gets a hit?
- 2.)
 - a.) Draw a tree diagram to illustrate the flipping of three coins.
 - b.) What is the probability of having exactly 2 heads?
 - c.) What is the probability of having at least 2 heads?

- 3.) In 1969, Tommie Agee, Cleon Jones, Ron Swoboda, Art Shamsky, Rod Gaspar, and Amos Otis were the main outfielders for the New York Mets. We are interested in how many different groups of outfielders they could have had.
- a.) Is this a permutations problem or a combinations problem?
- b.) How many different groups were possible?
- 4.) You are making a license plate. It has 3 letters followed by 4 numbers. How many different license plates can be made?
- 5.) In their lunch menu, the Olive Garden restaurant in Fort Smith, offers nine appetizers, three soups, two salads, thirty-four entrees, forty-two beverages and eight desserts. If you order one appetizer, one soup, one salad, one entrée, one beverage and one dessert, how many different meals could you order?
- 6.) A box contains 8 arthropods, 7 cephalopods and 5 paramecia. You reach into the box and pull out a creature at random. You then pull out another creature. What is the probability that you pull out two cephalopods?
- 7.) Fifteen people have formed a baseball team. We are interested in the number of nine player batting orders that can be created from the fifteen players.
- a.) Is this a combination problem or a permutation problem?
- b.) How many different lineups are possible?
- 8.) The following pieces of paper are in a box. If we randomly choose a piece of paper from the box, what is the expected value?

1	1	1	2	4
4	5	7	10	10

- 9.) For each of the scatter plots below, answer the following questions. Put your answers in the table below the graph.
- a.) Is there a correlation in the data? Write "Yes" or "No."
- b.) Give a reason for your answer in a.).
- c.) If you said "yes" in a.), is the correlation strong or weak? Write "strong" or "weak." If your answer to a.) was "no" then write N/A.
- d.) Give a reason for your answer in c.). If your answer to a.) was "no" then write N/A.
- e.) If you said "yes" in a.), is the correlation positive or negative? Write "positive" or "negative." If your answer to a.) was "no" then write N/A.
- f.) Give a reason for your answer in e.). If your answer to a.) was "no" then write N/A.

- 10.) Given the following data, find the correlation coefficient. These data are from the 1906 Cubs.

RUNS	OBA
103	.419
90	.349
81	.395
77	.324
75	.293
71	.324
65	.305
45	.357
30	.326
22	.281
11	.250

- 11.) The following chart gives some of Babe Ruth's career statistics.

Team	AB	H	2B	3B	HR
1914 Red Sox	10	2	1	0	0
1915 Red Sox	92	29	10	1	4
1916 Red Sox	136	37	5	3	3
1917 Red Sox	123	40	6	3	2
1918 Red Sox	317	95	26	11	11
1919 Red Sox	432	139	34	12	29
1920 Yankees	458	172	36	9	54
1921 Yankees	540	204	44	16	59
1922 Yankees	406	128	24	8	35
1923 Yankees	522	205	45	13	41
1924 Yankees	529	200	39	7	46
1925 Yankees	359	104	12	2	25
1926 Yankees	495	184	30	5	47
1927 Yankees	540	192	29	8	60
1928 Yankees	536	173	29	8	54
1929 Yankees	499	172	26	6	46
1930 Yankees	518	186	28	9	49
1931 Yankees	534	199	31	3	46
1932 Yankees	457	156	13	5	41
1933 Yankees	459	138	21	3	34
1934 Yankees	365	105	17	4	22
1935 Braves	72	13	0	0	6
TOTAL	8,399	2,873	506	136	714

- a.) If he had an at bat (AB), what was his career probability of hitting a home run (HR)?
- b.) In 1931, if he had a hit (H), what was the probability it was a double (2B)?

- 12.) The following are the 1967 National League second baseman with at least 35 plate appearances. Identify which you think was best and give a good explanation for your response.

		Batting Average	Double s	Home Runs	Runs Score d	On Base %	Fielding %
Julian Javier	Cardinals	.281	16	14	68	.314	.965
Glenn Beckert	Cubs	.280	32	5	91	.314	.968
Joe Morgan	Astros	.275	27	6	73	.378	.979
Tommy Helms	Reds	.274	27	2	40	.305	.978
Ron Hunt	Dodgers	.263	17	3	44	.344	.980
Bill Mazeroski	Pirates	.261	25	9	62	.292	.981
Cookie Rojas	Phillies	.259	21	4	60	.297	.977
Jerry Buchek	Mets	.236	11	14	35	.283	.977
Woody Woodward	Braves	.226	15	0	30	.287	.982
Tito Fuentes	Giants	.209	12	5	27	.266	.980

Exam #4

- 1.) You put \$5400 in the bank. The account gets an annual percentage rate of interest of 3.21% compounded quarterly. The money is left in the account for 4 years. No other money is added or removed from the accounts.
 - a.) Without inserting any numbers, write the formula you will need for this problem.
 - b.) Without doing any simplification, insert the right numbers in the right places in the formula.
 - c.) How much money will you have at the end of four years?
- 2.) You start putting money in your retirement fund at age 23. You put in \$500 each month. The interest of 10.25% is compounded quarterly. You retire at age 65.
 - a.) Without inserting any numbers, write the formula you will need for this problem.
 - b.) Without doing any simplification, insert the right numbers in the right places in the formula.
 - c.) How much money will you have at age 65?
 - d.) What is the total of all of your payments?
 - e.) How much interest did your money earn?
- 3.) Maher-Shalal-Hash-Baz started putting money in a college savings account. He wants to have \$120,000 in 18 years when his son will be ready for college. The interest rate of 9.5% is compounded quarterly. He'll make quarterly payments.
 - a.) Without inserting any numbers, write the formula you will need for this problem.
 - b.) Without doing any simplification, insert the right numbers in the right places in the formula.
 - c.) How much money will he have to pay each quarter?

- d.) What is the total of all of his payments?
- e.) How much interest did his money earn?
- 4.) You are buying a house. After the down payment, you need to borrow \$115,000. You will take out a mortgage to cover the remaining cost of the house. The interest rate for your 30 year mortgage is 6.15%.
 - a.) Without inserting any numbers, write the formula you will need for this problem.
 - b.) Without doing any simplification, insert the right numbers in the right places in the formula.
 - c.) What will be your monthly payment?
 - d.) What will be the total of all of your monthly payments?
 - e.) How much interest will you pay over the life of the loan?
- 5.) Find the area and perimeter of the following figure. All measurements are in feet.

- 6.) The window below is shaped like a rectangle with a semi-circle on top. What are the area and perimeter of the window? Give at least 4 places to the right of the decimal point.

- 7.) A cylindrical storage drum has a height of 2 feet and a diameter of one yard. Find the volume and surface area. Give at least 4 places to the right of the decimal point.
- 8.) In 1985, the highest paid major league baseball player made \$2,130,300. In 1986, the highest paid player earned \$2,800,000. That was an increase of 31.4369%. If salaries continued to grow exponentially at that rate, what would the highest paid player have earned in 2005? (The highest paid player in 2005 made \$26,000,000.)
- 9.) Below is the 1923 baseball design of the Polo Grounds in New York City.

Approximate the area (in acres) of fair territory. **BE SURE TO SHOW ALL OF YOUR WORK.**

- 10.) Mendeleevium-258 has a half-life of 51.5 days. Suppose you have 15 g of Mendeleevium-258. How much will you have after 48 hours?
- 11.) Suppose a ball is hit from a height of 4 feet with a velocity of 79 miles per hour (115.8667 feet per second) at an angle of elevation of 43° . Find the following.
 - a.) how far it travels
 - b.) how long it takes to land
 - c.) if it is a home run over an 8 foot tall fence at 400 feet (explain the reasoning for your answer)
- 12.) Explain the difference between elections that are determined by majority and plurality voting.
- 13.) Define a super-majority vote. Give examples of two elections that require a super-majority vote. Be sure to give the percentage or fraction required in each vote.
- 14.) Suppose the following are the votes received for the Most Valuable Player.
 - a.) Calculate the total points for each player shown. (1st place gets 14 points, 2nd place gets 9, 3rd place gets 8, 4th place gets 7, 5th place gets 6, 6th place gets 5, 7th place gets 4, 8th place gets 3, 9th place gets 2, 10th place gets 1)

Player, Club	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	Points
David Wright, NYM	10	15	6	1							
Carlos Delgado, NYM			3	5	4	5	11	4			
Aramis Ramirez, CHC			2	7	8	4	3	7		1	

- b.) What is the type of vote that this represents?

Final Exam

In exercises #1 - 3, a statement is given. For each exercise, identify one **AND ONLY ONE** of our fallacies that is exhibited in that statement. **GIVE A DETAILED EXPLANATION TO JUSTIFY YOUR CHOICE.**

- 1.) "Dr. Worth, you can't give me an 'F' in this class. If you give me an F my GPA will drop to 2.9 and I have to have a 3.0 to keep my scholarship."
- 2.) "I wore a hat during the test and made a high grade so I'm going to start wearing a hat for all of my tests."
- 3.) "Are you going to major in history or are you going to major in sociology?"
- 4.) Suppose you went back in time 1,000,000,000 (1 billion) seconds. What year would it be?
- 5.) Bubba's yard measures 200 meters by 300 meters. How many acres is that?
- 6.) If Randy Johnson's fastball is thrown 97 miles per hour, how fast is it in meters per second?
- 7.) In 2004, the total payroll for the New York Yankees was \$182,835,513. They paid Alex Rodriguez \$21,726,881. What was Rodriguez' salary as a percentage of the total team payroll? (data from <http://www.businessofbaseball.com/>)
- 8.) In 1879, Will White pitched 680 innings for the Cincinnati Reds. That was 93.6639118% of the team's total innings pitched. What was the Reds' total innings pitched?
- 9.) In 1957, Frank Robinson had 611 at bats, 197 hits and 29 home runs.
 - a.) What was his batting average?
 - b.) What percentage of his hits were home runs?
- 10.) In 1914, the Philadelphia Athletics won 99 games. In 1915, their wins went down 56.5656566%. Then, from 1915 to 1916, their wins went down 16.2790698%. How many games did they win in 1916?

- 11.) The following chart gives the pitching statistics for the 1969 New York Mets.

	W	L	WPCT	ERA	SV	IP	H	ER	BB	SO
Tom Seaver	25	7	.781	2.21	0	273.3	202	67	82	208
Jerry Koosman	17	9	.654	2.28	0	241	187	61	68	180
Gary Gentry	13	12	.520	3.43	0	233.7	192	89	81	154
Don Cardwell	8	10	.444	3.01	0	152.3	145	51	47	60
Jim McAndrew	6	7	.462	3.47	0	135	112	52	44	90
Ron Taylor	9	4	.692		13	76	61	23	24	42
Tug McGraw	9	3	.750	2.24	12	100.3	89	25	47	92
Nolan Ryan	6	3	.667	3.53	1	89.3	60	35	53	92
Cal Koonce	6	3	.667	4.99	7	83	85	46	42	48
Jack Dilauro	1	4	.200	2.40	1	63.7	50	17	18	27
Al Jackson	0	0	-----	10.64	0	11	18	13	4	10
Danny Frisella	0	0	-----	7.71	0	4.7	8	4	3	5
Jesse Hudson	0	0	-----	4.50	0	2	2	1	2	3
Bob Johnson	0	0	-----	0.00	1	1.7	1	0	1	1
Les Rohr	0	0	-----	20.25	0	1.3	5	3	1	0
Totals	100	62	.617	2.99	35	1468.3	1217	487	517	1012

- a.) How many of the team's pitchers struck out more than 90 batters?

- b.) What was Ron Taylor's ERA?
- c.) For those with at least 162 innings pitched, who had the lowest ERA?
- d.) How many of the pitchers struck out at least twice as many batters as they walked?

12.) The following are all of the 1964 National League shortstops with at least 400 plate appearances.

	AB	AVG	R	SB	2B	3B	HR	FAVG
Dick Groat	636	.292	70	2	35	6	1	.949
Maury Wills	630	.275	81	53	15	5	2	.963
Leo Cardenas	597	.251	61	4	32	2	9	.960
Denis Menke	505	.283	79	4	29	5	20	.964
Andre Rodgers	448	.239	50	5	17	3	12	.965
Eddie Kasko	448	.243	45	4	16	1	0	.978
Dick Schofield	398	.246	50	1	22	5	3	.950
Roy McMillan	392	.214	31	4	8	2	1	.975
Jose Pagan	367	.223	33	5	10	1	1	.958

- a.) Draw a line graph showing the number of doubles for these players.
- b.) Which of these shortstops was the best in 1964? Explain your answer.

13.) The following chart shows the 1964 National League home run leaders.

Hank Aaron	24
Dick Allen	29
Ernie Banks	23
Walt Bond	20
Ken Boyer	24
Johnny Callison	31
Rico Carty	22
Orlando Cepeda	31
Joe Christopher	16
Billy Cowan	19
Tom Haller	16
Jim Ray Hart	31
Frank Howard	24
Deron Johnson	21
Jerry Lynch	16
Eddie Mathews	23
Willie Mays	47
Willie McCovey	18
Denis Menke	20
Vada Pinson	23
Frank Robinson	29
Ron Santo	30
Charley Smith	20
Willie Stargell	21
Joe Torre	20
Bill White	21
Billy Williams	33

- a.) What is the mean?
- b.) What is the median?
- c.) What is the mode?
- d.) What is the minimum?
- e.) What is the lower quartile?
- f.) What is the upper quartile?
- g.) What is the maximum?
- h.) Who hit the most home runs in the American League in 1964?

14.) The following chart shows the number of doubles (denoted by diamonds), triples (denoted by triangles) and home runs (denoted by squares) for Willie Mays (the greatest all-around player in history) in each year of his career. [Note: the quantity is represented by the middle of the shape.]

- a.) How many doubles did Mays hit in 1966?
- b.) In what year did Mays hit the most triples?
- c.) How many triples did Mays hit the year he hit the most?
- d.) How many times did Mays have more doubles than home runs?
- e.) How many times did Mays exceed 30 in both doubles AND home runs?
- f.) How many times did Mays have at least 10 triples?
- g.) What is the most consecutive years Mays hit at least 30 home runs?
- h.) Did Mays ever have a season when he had at least 20 of each kind of hit?

15.) The following chart shows home run data for the 1982 Milwaukee Brewers.

- a.) Four players had more than 25 home runs. Who were they?
- b.) How many home runs did Ned Yost hit?
- c.) The team hit 216 home runs. Cecil Cooper hit 32. What is the angle for his piece of the pie? Give at least two decimal places in your answer.

- d.) The angle for Mark Brouhard's piece of the pie is 6.66666667° . How many home runs did he hit?
- 16.) Johan Santana (pitcher), Ramon Castro (catcher), Carlos Delgado (first base), Luis Castillo (second base), Jose Reyes (shortstop), David Wright (third base), Daniel Murphy (left field), Carlos Beltran (center field) and Ryan Church (right field) will be playing for the Mets. With the restrictions that Santana will bat 9th and Reyes will bat 1st, how many different batting orders are possible.
- 17.) In 1897, all three outfielders for the Phillies batted at least .400. Billy Hamilton hit .404 and Sam Thompson and Ed Delahanty each hit .407. We will view their batting averages as probabilities, assume that all at bats are independent events and ignore walks, etc.
- a.) Assume that the three bat right after each other in one inning. What is the probability that all three get hits?
- b.) Assume that the three bat right after each other in one inning. What is the probability that all three make outs?
- c.) Assume that the three bat right after each other in one inning. What is the probability that Hamilton gets a hit but Thompson and Delahanty make outs?
- d.) If Delahanty has two at bats, what is the probability that he gets hits both times?
- 18.) a.) Draw a tree diagram to illustrate the flipping of three coins.
 b.) What is the probability of having exactly 2 heads?
 c.) What is the probability of having at least 2 heads?
- 19.) You put \$3400 in a certificate of deposit account for 4 years. It receives 3.5% interest compounded quarterly. You neither take out any money nor put in any more money.
- a.) Without inserting any numbers, write out the formula that will figure out the amount of money you will have after 4 years.
 b.) Without doing any simplification, insert all of the numbers into the formula.
 c.) How much money will you have after 4 years?
- 20.) You start putting money in your retirement fund at age 25. You put in \$250 each month. The interest of 10.125% is compounded monthly. You retire at age 63.
- a.) Without inserting any numbers, write out the formula that will figure out the amount of money you will have when you retire.
 b.) Without doing any simplification, insert all of the numbers into the formula.
 c.) How much money will you have at age 63?
 d.) What is the total of all of your payments?
 e.) How much interest did your money earn?
- 21.) You are buying a house. After the down payment, you need to borrow \$105,000. You will take out a mortgage to cover the remaining cost of the house. The interest rate for your 30 year mortgage is 6.55%. Throughout the problem we will ignore escrow payments that might be added to the payment for insurance and taxes.
- a.) WITHOUT SUBSTITUTING IN ANY NUMBERS, write the formula you will use to find the monthly payment on this loan.
 b.) WITHOUT SIMPLIFYING ANYTHING, insert the correct numbers into the

- formula.
- c.) What will be your monthly payment?
 - d.) What will be the total of all of your monthly payments?
 - e.) How much interest will you pay over the life of the loan?
- 22.) Find the volume and surface area of the box shown below. Assume all measurements are in feet.
- 23.) The window below is shaped like a rectangle with a semi-circle on top. What are the area and perimeter of the window? **GIVE AT LEAST 4 PLACES TO THE RIGHT OF THE DECIMAL POINT!!**
- 24.) Mendeleevium-258 has a half-life of 51.5 days. Suppose you have 15 g of Mendeleevium-258. How much will you have after two weeks?
- 25.) Suppose the following are votes received for the Most Valuable Player.
- a.) Calculate the total points for each player shown. (1st place gets 14 points, 2nd place gets 9, 3rd place gets 8, 4th place gets 7, 5th place gets 6, 6th place gets 5, 7th place gets 4, 8th place gets 3, 9th place gets 2, 10th place gets 1)

Player, Club	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	Points
David Wright, NYM	12	13	6	1							
Carlos Delgado, NYM			3	5	7	5	11	4			
Aramis Ramirez, CHC			2	7	8	4	3	7		1	

- b.) What is the type of vote that this represents?