MAT181 Statistics Name_____

Practice Final Exam 1

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Find the indicated probability.

1) The table below describes the smoking habits of a group of asthma sufferers. 1) a) 0.069 b) 0.515

	Nonsmoker	Occasional smoker	Regular smoker	Heavy smoker	Total
Men	334	50	68	32	484
Women	357	30	89	37	513
Total	691	80	157	69	997

a) Find the probability of getting a heavy smoker.

$P(\text{Heavy smoker}) = \frac{69}{997} = 0.069$

b) Find the probability of a woman in this group of asthma sufferers.

$P(\text{woman}) = \frac{513}{997} = 0.515$

Find the indicated probability. Express your answer as a simplified fraction unless otherwise noted.

2) The table below describes the smoking habits of a group of asthma sufferers. 2) _____

	Nonsmoker	Light smoker	Heavy smoker	Total
Men	391	61	65	517
Women	312	72	80	464
Total	703	133	145	981

If one of the 981 subjects is randomly selected, find the probability that the person chosen is a nonsmoker given that it is a woman. Round to the nearest thousandth.

$P(\text{nonsmoker} \mid \text{woman}) = \frac{312}{464} = 0.672$

Solve the problem.

3) The table lists the drinking habits of a group of college students. If a student is chosen at random, find the probability of getting someone who is a regular or heavy drinker. Round your answer to three decimal places. 3) _____

Sex	Non-drinker	Regular Drinker	Heavy Drinker	Total
Man	135	44	5	184
Woman	187	21	6	214
Total	322	65	11	398

$P(\text{regular or heavy drinker}) = \frac{65+11}{398} = \frac{76}{398} = 0.191$

4) The table lists the drinking habits of a group of college students. If a student is chosen at random, find the probability of getting someone who is a man or a non-drinker. Round your answer to three decimal places. 4) _____

Sex	Non-drinker	Regular Drinker	Heavy Drinker	Total
Man	135	52	5	192
Woman	187	21	9	217
Total	322	73	14	409

$P(\text{man or non drinker}) = \frac{192+322-135}{409} = \frac{379}{409} = 0.927$

Find the indicated probability. Give your answer as a simplified fraction.

5) The overnight shipping business has skyrocketed in the last ten years. The single greatest predictor of a company's success has been proven time and again to be customer service. A study was conducted to study the customer satisfaction levels for one overnight shipping business. In addition to the customer's satisfaction level, the customers were asked how often they used overnight shipping. The results are shown below in the following table. A customer is chosen at random. Given that the customer uses the company less than two times per month, what is the probability that they expressed low satisfaction with the company? 5) _____

	Satisfaction level			
Frequency of Use	High	Medium	Low	TOTAL
< 2 per month	250	140	10	400
2 - 5 per month	140	55	5	200
> 5 per month	70	25	5	100
TOTAL	460	220	20	700

$P(\text{low satisfaction} \mid < \text{two times}) = \frac{10}{400} = 0.025$

6) The managers of a corporation were surveyed to determine the background that leads to a successful manager. Each manager was rated as being either a good, fair, or poor manager by his/her boss. The manager's educational background was also noted. The data appear below. Given that a manager is only a fair manager, what is the probability that this manager has a college degree? 6) _____

Educational Background

Manager Rating	H. S. Degree	Some College	College Degree	Master's or Ph.D.	Totals
Good	4	2	28	5	39
Fair	8	14	41	24	87
Poor	7	5	3	19	34
Totals	19	21	72	48	160

$P(\text{college degree} \mid \text{fair manager}) = \frac{41}{87} = 0.471$

Provide an appropriate response.

7) SAT scores have a mean of 1026 and a standard deviation of 209. ACT scores have a mean of 20.8 and a standard deviation of 4.8. A student takes both tests while a junior and scores 1130 on the SAT and 25 on the ACT. Compare the scores. 7) _____

SAT: $\mu = 1026$ $\sigma = 209$ ACT: $\mu = 20.8$ $\sigma = 4.8$

$z = \frac{x - \mu}{\sigma}$

$z = \frac{1130 - 1026}{209}$ $z = \frac{25 - 20.8}{4.8}$

$z = 0.5$ $z = 0.875$

The student did better on the ACT than the SAT's.

8) Two high school students took equivalent language tests, one in German and one in French. The student taking the German test, for which the mean was 66 and the standard deviation was 8, scored an 82, while the student taking the French test, for which the mean was 27 and the standard deviation was 5, scored a 35. Compare the scores. 8) _____

German: $\mu = 66$ $\sigma = 8$ French: $\mu = 27$ $\sigma = 5$

$z = \frac{82 - 66}{8} = 2$ $z = \frac{35 - 27}{5} = \frac{8}{5} = 1.6$

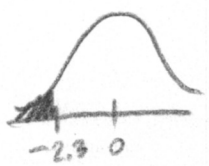
Student did better on the German test.

9) A physical fitness association is including the mile run in its secondary-school fitness test. The time for this event for boys in secondary school is known to possess a normal distribution with a mean of 440 seconds and a standard deviation of 40 seconds. Find the probability that a randomly selected boy in secondary school can run the mile in less than 348 seconds. 9) _____

$\mu = 440$ $\sigma = 40$

$P(x < 348) = P(z < -2.3) = 0.0107$

$\frac{348 - 440}{40} = \frac{-92}{40} = -2.3$



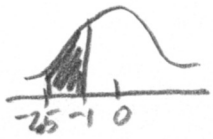
10) Suppose a brewery has a filling machine that fills 12 ounce bottles of beer. It is known that the amount of beer poured by this filling machine follows a normal distribution with a mean of 12.29 ounces and a standard deviation of 0.04 ounce. Find the probability that the bottle contains between 12.19 and 12.25 ounces. 10) _____

$\mu = 12.29 \quad \sigma = 0.04$

$P(12.19 < x < 12.25) = P(-2.5 < z < -1) = 0.1587 - 0.0062$

$= 0.1525$

$\frac{12.19 - 12.29}{0.04} = -2.5 \qquad \frac{12.25 - 12.29}{0.04} = -1$



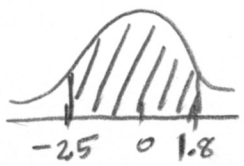
11) A new phone system was installed last year to help reduce the expense of personal calls that were being made by employees. Before the new system was installed, the amount being spent on personal calls followed a normal distribution with an average of $600 per month and a standard deviation of $50 per month. Refer to such expenses as PCE's (personal call expenses). Using the distribution above, what is the probability that a randomly selected month had a PCE of between $475.00 and $690.00? 11) _____

$\mu = 600 \quad \sigma = 50$

$P(475 < x < 690) = P(-2.5 < z < 1.8) = 0.9641 - 0.0062$

$= 0.9579$

$\frac{475 - 600}{50} = -2.5 \qquad \frac{690 - 600}{50} = 1.8$

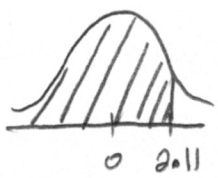


12) Human body temperatures are normally distributed with a mean of 98.20 °F and a standard deviation of 0.62 °F. If 19 people are randomly selected, find the probability that their **mean** body temperature will be less than 98.50 °F. 12) _____

$\mu = 98.2 \quad \sigma = 0.62 \quad n = 19$

$P(\bar{x} < 98.5) = P(z < 2.11) = 0.9826$

$\frac{98.5 - 98.2}{0.62/\sqrt{19}} = 2.11$



13) Assume that women's heights are normally distributed with a mean of 63.6 inches and a standard deviation of 2.5 inches. If 90 women are randomly selected, find the probability that they have a **mean** height between 62.9 inches and 64.0 inches. 13) _____

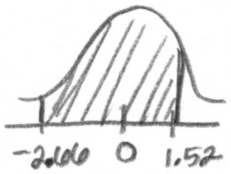
$\mu = 63.6 \quad \sigma = 2.5 \quad n = 90$

$P(62.9 < \bar{x} < 64.0) = P(-2.66 < z < 1.52) = 0.9357 - 0.0039$

$= 0.9318$

$\frac{62.9 - 63.6}{2.5/\sqrt{90}} \quad \frac{64 - 63.6}{2.5/\sqrt{90}}$

$-2.66 \quad 1.52$



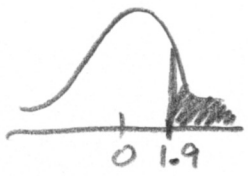
14) A bank's loan officer rates applicants for credit. The ratings are normally distributed with a mean of 200 and a standard deviation of 50. If 40 different applicants are randomly selected, find the probability that their **mean** is above 215. 14) _____

$\mu = 200 \quad \sigma = 50 \quad n = 40$

$P(\bar{x} > 215) = P(z > 1.9) = 1 - 0.9713 = 0.0287$

$\frac{215 - 200}{50/\sqrt{40}}$

1.90



15) The weights of the fish in a certain lake are normally distributed with a mean of 20 lb and a standard deviation of 9. If 9 fish are randomly selected, what is the probability that the **mean** weight will be between 17.6 and 23.6 lb? 15) _____

$\mu = 20 \quad \sigma = 9 \quad n = 9$

$P(17.6 < \bar{x} < 23.6) = P(-0.8 < z < 1.2) = 0.8849 - 0.2119$

$= 0.673$

$\frac{17.6 - 20}{9/\sqrt{9}} \quad \frac{23.6 - 20}{9/\sqrt{9}}$

$-0.8 \quad 1.2$