MATH 101 Rec. no. _____ Seat no. _____

Final Exam Name: _____

Form A Signature: _____

May 6, 2010 Student no: _____

Instructions:

1. Use a no. 2 pencil.
2. Write your z-id number in the last 6 boxes on the answer form, and fill in the corresponding number ovals.
3. Fill in the oval for "Form A" on the answer form.
4. There are 40 questions. It is your responsibility to see you have a complete form.
5. Tables and formulas which may be useful are on the last page.

---

1. Which of the following general statements about visual representations of data is FALSE?

   (a) In a frequency polygon (or graph) the mode corresponds to the highest point on the figure.

   (b) The graph of a normally distributed data set is sometimes called a *bell curve*.

   (c) A *histogram* is often called a *bar chart*.

   (d) In a pie chart of Dave's expenses, if the section labeled Rent is more than "half the pie", then Dave spends more than 50% of his money on rent.

   (e) The mean of a data set is the middle number of the labels of the bar chart.

2. Which of the following statements concerning measures of central tendency is FALSE?

   (a) The median is the measure of central tendency which is often used when one discusses such things as salaries and house prices.

   (b) The mode of a set of contributions to a charity can be thought of as "the usual gift".

   (c) The mean of a data set can be drastically altered by a few extreme values.

   (d) A measure of dispersion can be used to improve the description of a data set given by a measure of central tendency by measuing how "spread out" the data set is.

   (e) A data set can only have one mode.

3. Debbie has taken 3 hour exams and has an average of 76%. She needs an average of 80% to get a B for her final grade. What is the minimum score she can get on her fouth (and last) hour exam and get a B for the course?

   (a) 80%
   (b) 84%
   (c) 92%
   (d) 96%
   (e) She cannot get a B

4. UDS delivered 40 packages with a mean weight of 2.1 pounds. What was the total weight, in pounds, of all the packages that were delivered?

   (a) 2.1
   (b) 19.05
   (c) 42.1
   (d) 84
   (e) No way to tell.

5. The frequency distribution of salaries in a small company is given below. Determine the mean salary of the employees.

Yearly salary (Dollars)	Number of employees
\$16,000.	7
\$17,500.	9
\$20,000.	8
\$22,500.	4
\$25,000.	2

   (a) \$20,000.
   (b) \$17,500.
   (c) \$18,750.
   (d) \$18,983.
   (e) \$20,200.

6. What is the median of the following set of numbers?

$$\{18, 22, 23, 17, 14, 27, 19, 22, 20, 25\}$$

   (a) 22
   (b) 21
   (c) 20.5
   (d) 20.7
   (e) 14

7. A distribution has the following quartile points; $Q_1 = 16.2$, $Q_2 = 44.3$, and $Q_3 = 65.4$. Which of the following is FALSE?

   (a) The quartile deviation is 24.6.
   (b) The interquartile range is 49.2.
   (c) 50% of the data is above 49.2.
   (d) 25% of the data is below 16.2.
   (e) Approximately 50% of the data is between 16.2 and 65.4

8. A newspaper article states that the average price of a house in Kallop last year was $132,800. This number is

   (a) probably the median price of a house in the community.

   (b) probably the mode of the frequency distribution of prices of houses in the community.

   (c) an indication that the frequency distribution of prices of houses in the community is bimodal.

   (d) probably the mean price of a house in the community.

   (e) greater than the price of any house in the community.

9. Which of the following is <u>not</u> a probability?

   (a) 0
   (b) .16
   (c) 1
   (d) 1.4
   (e) $\frac{1}{6}$

10. The probability that Janice will get a 'C' on today's test is .23. What is the probability that Janice will not get a 'C'?

    (a) 1.23.

    (b) 1.00.

    (c) .23.

    (d) .77.

    (e) Can not be calculated from the information provided.

11. A standard deck of playing cards contains 52 cards, four of which are kings. Two cards are drawn at random from the deck, one after the other, without replacement. Consider the following events: the *first* card is an king; and, the *second* card is an king. Which of the following describes the relationship between the events?

    (a) The events are mutually exclusive.

    (b) THe events are not mutually exclusive.

    (c) The events are independent.

    (d) The events are dependent.

    (e) The events are not mutually exclusive and they are independent.

12. On a particular day, the probability of rain is 0.35, the probability of damaging winds is 0.40, and the probability of both is 0.20. What is the probability of rain OR damaging winds?

    (a) 0.15
    (b) 0.20
    (c) 0.25
    (d) 0.55
    (e) 0.95

13. Which of the following is not a characteristic of a normal distribution with mean μ and standard deviation σ?

    (a) about 50% of the data items are less than the mean.

    (b) About 99% of the data items are between $\mu - 3\sigma$ and $\mu + 3\sigma$.

    (c) The mean, median and mode are the same.

    (d) 38.5% of the items are between $\mu - 1.2\sigma$ and μ.

    (e) About 34.1 % of the data is between $\mu + 1\sigma$ and $\mu + 2\sigma$.

14. A poll of 400 men showed that they watched sports on television an average of 4.1 hours per weekend, with a standard deviation of 0.3 hours. What would be the standard deviation of the *associated sampling distribution* for the number of hours watched if all samples of size 45 were taken from this group of 400 men?

    (a) 0.014 hours
    (b) 0.042 hours
    (c) 0.045 hours
    (d) 0.283 hours
    (e) 0.3 hours

15. A biologist examines a group of 1000 potato beetles. She expects to find that 17% of the beetles are male. She observes that 208 are males. Compute a $\chi 2$ statistic for the associated distributions.

    (a) 0.224
    (b) 0.269
    (c) 8.494
    (d) 8.766
    (e) 10.234

16. The lifetimes of Durable brand batteries are normally distributed with a mean lifetime of 18 hours and a standard deviation of 2 hours. George bought one of these batteries. What is the probability that his battery will last more than 18 hours?

    (a) .159
    (b) .341
    (c) .5
    (d) 50%
    (e) 34%

17. Small cans of an energy drink come in a size with a mean weight of 6 fluid ounces and a standard deviation of 0.4 fluid ounces. What percentage of a shipment of the 6 fluid ounce cans can be expected to weigh between 5.6 and 6.6 ounces?

    (a) 22.6
    (b) 34.1
    (c) 43.3
    (d) 77.4
    (e) Not enough info given.

18. The manager of the company that you work for reports that the national average for the yearly salary of people doing your job is between $30,320 and $36,108. He says that there is a degree of confidence of .95 in these figures. Which of the following is *true*?

    (a) There is a .95 probability that your salary is in this range.

    (b) There is a .05 probability that your salary is not in this range.

    (c) The figures represent a point estimate.

    (d) There is a .95 probability that the average salary for workers in the country doing your job actually lies in this interval.

    (e) The population is the workers in your company.

19. Which of the following is the negation of the statement
If Dave is interested in etymology, then he will study Latin.

    (a) If Dave does not study Latin, then he is not interested in etymology.

    (b) Dave is interested in etymology and he will not study Latin.

    (c) Dave is interested in etymology and he will study Latin.

    (d) Dave is interested in etymology or he will study Latin.

    (e) If Dave is interested in Latin, then he will not study Latin.

20. Consider the following argument:

Premises:	Some biology majors graduate with honors.
	Chris is a biology major
Conclusion:	Chris graduates with honors.

    This argument is an example of

    (a) direct reasoning

    (b) indirect reasoning

    (c) a logical fallacy (or mistake in reasoning)

    (d) inductive reasoning

    (e) reasoning by transitivity.

21. What is the negation of the following statement?
All dogs are nice and some cats are aloof.

    (a) All dogs are not nice and some cats are not aloof.

    (b) All dogs are nice or some cats are aloof.

    (c) Some dogs are not nice and all cats are not aloof.

    (d) All dogs are not nice or some cats are not aloof.

    (e) Some dogs are not nice or all cats are not aloof.

22. Assume the following premise is true.

    (i) If Joe has to use an Elmo projector, then he will have a headache.

    (ii) If Joe has a headache, then he will not be in a good mood.

    (iii) Joe is in a good mood.

    Which of the following is a logically valid conclusion that uses ALL of these statements?

    (a) Joe does not have a headache.

    (b) Joe did not have to use an Elmo projector.

    (c) If Joe has to use an Elmo projector, then he will not be in a good mood.

    (d) If Joe is in a good mood, then he does not have a headache.

    (e) If Joe does not have a headache, then he did not use an Elmo projector.

23. Michele interviewed 124 people. 72 of them had MP3 players, and 83 of them had cell phones. She did not keep track of the number who had both (or neither). What is the best she can say about the number of people with both?

    (a) 11 had both.

    (b) Between 0 and 72 had both.

    (c) Between 11 and 72 had both.

    (d) Between 31 and 72 had both.

    (e) Between 31 and 83 had both.

24. A wildlife researcher is investigating the population of grebes on a western lake. The first time she and her crew go to the lake they capture and tag 345 grebes, they then release the grebes. About a month later they return to the lake and capture 377 grebes. Of these 377 grebes, 123 were grebes that had been tagged on the previous visit. What should the researchers estimate of the grebe population be?

    (a) 361
    (b) 599
    (c) 1057
    (d) 130,065
    (e) 40,710

25. Lance has 8 projects left to grade, 3 are FORM A and 5 are FORM B. The projects are stacked in a random order. What is the probability that the top project is FORM A and the second is FORM B?

    (a) .234
    (b) .268
    (c) 1
    (d) 1.089
    (e) None of these

26. Determine the geometric relationship between the following two lines.

$$7x - y = 15$$
$$8y = 14x - 9$$

(a) The lines are parallel, but distinct.

(b) The lines are the same.

(c) the lines intersect in a single point.

(d) One line is horizontal and the other is vertical.

(e) None of the above is correct.

27. In which of the following intervals can you be sure that the polynomial $y = x3 + x - 1$ has a root?

(a) [0,0.5]
(b) [0.5,1]
(c) [1,1.5]
(d) [1.5,2]
(e) [2,2.5]

28. Denise must purchase a number of ink jet printers for use in her company. She has determined that the company needs two different models - the 1A and the 20Q. Model 1A's cost \$38 and model 20Q cost \$61. They need at least 25 of model 1A and at least 12 of model 20Q, but they need at least 50 of the printers all together.

Let x denote the number of 1A printers purchased, and y the number of 20Q's purchased. Which of the following systems of inequalities must be satisfied if the purchase meets all of Denise's requirements?

(a) $\begin{cases} 0 \leq 38x + 61y \\ 0 \leq x \\ 0 \leq y \end{cases}$

(b) $\begin{cases} 0 \leq x + y \\ 25 \leq x \\ 12 \leq y \end{cases}$

(c) $\begin{cases} x + y \leq 50 \\ 25 \leq x \\ 12 \leq y \end{cases}$

(d) $\begin{cases} 50 \leq x + y \\ 25 \leq x \\ 12 \leq y \end{cases}$

(e) $\begin{cases} 50 \leq 38x + 61y \\ 25 \leq x \\ 12 \leq y \end{cases}$

29. Larry has a garden plot which measures 5 ft. by 8 ft. He wants to enlarge it to create a plot with area 70 square feet by clearing a border of x feet along two adjacent sides. What equation must x satisfy?

(a) $x^2 + 40x = 0$
(b) $x^2 - 30 = 0$
(c) $x^2 - 13x - 30 = 0$
(d) $x^2 + 13x + 30 = 0$
(e) $x^2 + 13x - 30 = 0$

30. Zack has a spruce tree in his back yard that casts a 62 foot shadow. At the same time of day a 32 foot lamp post casts a 40 foot shadow. How tall is his spruce tree?

(a) 48 feet
(b) 49.6 feet
(c) 70 feet
(d) 76 feet
(e) 77.5 feet

31. There is a kite caught at the top of an 80 foot tall tree and when the kite string is stretched tight, it touches the ground 60 feet from the base of the tree. What is length of the string?

(a) 20 feet
(b) 20.6 feet
(c) 100 feet
(d) 140 feet
(e) 278.6 feet

32. Neville has been collecting coins in a bank for his son. The bank contains 78 coins, and consists of only nickels and dimes. The coins in the bank are worth \$5.70. If x denotes the number of nickels and y denotes the number of dimes, which system of equations below can be used to determine the number of coins of each type in the bank?

(a) $\begin{cases} x+y &= 5.70 \\ x+y &= 78 \end{cases}$
(b) $\begin{cases} x+y &= 78 \\ .05x+.10y &= 5.70 \end{cases}$
(c) $\begin{cases} 5x+10y &= 57 \\ x+y &= 78 \end{cases}$
(d) $\begin{cases} y &= 78-x \\ x &= 5.70+y \end{cases}$
(e) $\begin{cases} .5x+.1y &= 5.7 \\ x+y &= 78 \end{cases}$

33. Last month Stan bought a can of regular coffee and a can of decaffeinated coffee. He spent \$9.48 on the coffee. This month he bought two cans of decaffeinated coffee and one can of regular coffee, and he spent \$14.67. Let x be the number of cans of regular coffee and let y be the number cans of decaf, and solve the related system to find out how much the decaffeinated coffee is per can?

(a) \$3.29
(b) \$4.29
(c) \$5.19
(d) \$6.19
(e) \$8.05

34. Max's Super Hot Chili comes in two sizes of cans, 26 oz. and 18 oz. Max sells the 26 oz can for \$4.35, and Jane has a coupon for \$.45 off this size. What is the price per ounce of chili in the 18 oz. size, if it is a better buy (cheaper)?

(a) \$.15
(b) less than \$.15
(c) more than \$.15
(d) less than \$.21
(e) more than \$.21

35. What is the monthly payment required to pay off in 20 years a loan of $50,000. borrowed at an annual interest rate 9.75%, which is compounded monthly?

(a) $406.25
(b) $474.26
(c) $569.11
(d) $812.50
(e) $8,125.

36. Suppose that a person is able to save $250 per month at 8% interest, compounded monthly, starting at age 21. If they continue this saving, then how much will they have when they turn 65 (after 44 complete years)?

(a) $12,734.44
(b) $132,000
(c) $137,633.71
(d) $176,310.70
(e) $1,214,702.72

37. A bank offers a loan at 10.2% APR, compounded monthly. What is the or Annual Percentage Yield or APY (the effective yearly interest rate).

(a) 9.9%
(b) 10.2%
(c) 10.6%
(d) 10.7%
(e) 11.2%

38. Which of the following statements about installment loans is FALSE?

(a) For a fixed term and interest rate, if the principal is doubled, then the monthly payment will double.

(b) For a fixed term, principal and interest rate, if you pay extra on every monthly payment then you will end up paying less money (in total) than if you just make the scheduled monthly payment.

(c) For a fixed term and principal, if the interest rate is doubled, then the payment will be double.

(d) For a fixed principal and interest rate, the shorter the term of the loan is the less the total of your payments will be.

(e) If you know the interest rate, the term and monthly payment of a loan, then you can compute the principal.

39. What is the maximum of $y = x^2 + 2x + 4$ for $0 \leq x \leq 4$?

(a) 3
(b) 4
(c) 6
(d) 28
(e) None of these

40. Over which of the following intervals is the rate of change of $p(x) = x^2 + 3x + 4$ the greatest?

(a) [0,1]
(b) [0,2]
(c) [0,3]
(d) [1,2]
(e) [1,3]

1. Chi-square distribution table:

d	.05	.025	.01	.005
1	3.894	5.024	6.635	7.879
2	5.991	7.378	9.210	10.597
3	7.815	9.348	11.345	12.838
4	9.488	11.143	13.277	14.860

2. Normal curve percentages:

z	P	z	P	z	P	z	P
.0	0.0	1.0	34.1	2.0	47.7	3.0	49.9
.1	4.0	1.1	36.4	2.1	48.2	3.1	49.9
.2	7.9	1.2	38.5	2.2	48.6		
.3	11.8	1.3	40.3	2.3	48.9		
.4	15.5	1.4	41.9	2.4	49.2		
.5	19.2	1.5	43.3	2.5	49.4		
.6	22.6	1.6	44.5	2.6	49.5		
.7	25.8	1.7	45.5	2.7	49.7		
.8	28.8	1.8	46.4	2.8	49.7		
.9	31.6	1.9	47.1	2.9	49.8		

3. Chi-square formula:

$$\chi 2 = \frac{(E_1 - F_1)^2}{E_1} + \frac{(E_2 - F_2)^2}{E_2} + \cdots + \frac{(E_n - F_n)^2}{E_n}.$$

4. Standard deviation relationships (similar for the estimators $\hat{\sigma}$ and $\hat{\sigma}_{\bar{x}}$):

$$\sigma = S\sqrt{\frac{n}{n-1}}$$

$$\sigma_{\bar{x}} = \begin{cases} \dfrac{\sigma}{\sqrt{n}} & \text{for an infinite population} \\ \dfrac{\sigma}{\sqrt{n}}\sqrt{\dfrac{N-n}{n-1}} & \text{for a population of size } N \end{cases}$$

5. Monthly payment formula: (N months)

$$M = \frac{P(1 + \frac{i}{12})^N(\frac{i}{12})}{\left[(1 + \frac{i}{12})^N - 1\right]}$$

6. Monthly Savings Formula: (N months)

$$D = \left(\tfrac{12}{i}\right)\left[\left(1 + \tfrac{i}{12}\right)^N - 1\right] M$$