Contemporary Mathematics
Math 1030
Sample Final Exam – Chapters 7, 9-11, 13-15
Time Limit: 1 Hour and 50 Minutes   Open Textbook   Calculator Allowed: Scientific

Name:_____

The point value of each problem is in the left-hand margin. You must show your work to receive any credit, except in problems 1 & 2. Work neatly.

(20) 1. Fill in the blanks.

(a) The probability of getting a HHT in three consecutive flips of a fair coin is _____ .

(b) The median of the data 2, 4, 6, 7, 8, 9, 9, 10 is _____ .

(c) The sum of interior angles of a 8-sided convex polygon is _____ degrees.

(d) If a guy has a choice of 3 neck ties, 2 shorts and 5 pairs of pants for an outfit, he can wear _____ different outfits.

(e) The the vertex of the parabola $y = 3x^2 - 12x + 5$ is the point _____ .

(f) If $y = \frac{k}{x}$, the y varies _____ as x.

(g) The total accumulation of a \$1000 investment earning 6% interest compounded monthly after 1 month is _____ .

(h) The value of $P(9, 7)$ is _____ .

(i) The area of triangle with sides 2 , 5 and 8 is _____ .

(j) The x-intercept of the graph of the parabola $y = -3x^2 + 5x + 2$ is the point (_____ , _____).

(6) 2. True or False.

(   ) (a) If $3^x = \frac{1}{9}$, then $x = \frac{1}{27}$.

(   ) (b) The perimeter of the right triangle with legs of length 3 and 4 is 12 .

(   ) (c) The average constituency of a state is the ratio of the population of the state to the number of representatives from that state.

(   ) (d) $P(E \text{ or } F) = P(E) + P(F) - P(E \text{ and } F)$.

(   ) (e) The probability of a ball chosen in random, from a collection of 7 red balls, being red is 1 .

(   ) (f) The first quartile of the data 2, 4, 6, 6, 8, 9, 9, 10 is 6 .

(10) 3. Find the sample mean, sample variance and standard deviation of the following data. **Show your work.**

$$-5,\ 6,\ 7,\ 12,\ -7,\ 18,\ 8,\ 4,\ 11$$

(8) 4. Find and state the five-number summary of the following data and construct its box plot. **Show your work.**

$$340,\ 300,\ 520,\ 340,\ 320,\ 290,\ 260,\ 330$$

(8) 5. A standard 52-card deck contains four 10's and twelve face cards (jacks, queens and kings). What is the probability of getting two 10's and three face cards in a 5-card poker hand? Note: You must explain your work through words and/or formula(s).

(10) 6. Find the x- and y-intercepts and vertex of the parabola $y = -2x^2 + 6x + 5$ and draw its graph. **Show your work.**

(9) 7. Find the distance labeled x in the following. **Show your work.**
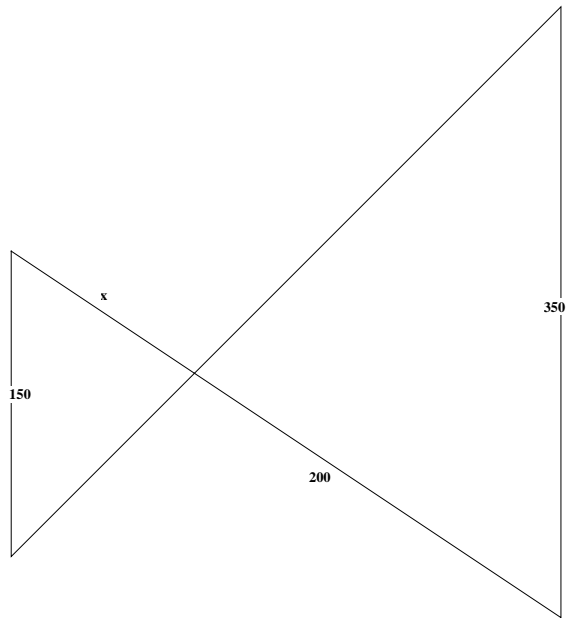
(10) 8. For how long shall we invest $500 per month in an ordinary annuity earning 4% annual interest compounded monthly in order to accumulate a total of $30,000? **Show your work.**

(8) 9. A cylindrical pitcher with radius of 4 inches and height of 10 inches is half full of water. How many glasses shaped like an inverted cone with a height of 2 inches and radius of 2 inches can be filled from this pitcher? **Show your work.**

(7) 10. What will be your monthly payments if you borrow \$200,000 through a 20-year mortgage with 4% annual interest rate, compounded monthly? **Show your work.**

(8) 11. Suppose a population grows logistically with the initial growth rate of 6%. If after 5 years the population size is 50% of its maximum size, find the percentage of the maximum size the population size will reach after 8 years? Note: Show your work including the model.

(10) 12. Twenty-five households are polled in a marketing survey, and table below lists the numbers of quarts of milk purchased during a particular week. Construct a relative frequency histogram of this data. **Show your work.**

$$0 \quad 3 \quad 5 \quad 4 \quad 3 \quad 2 \quad 1 \quad 3 \quad 1 \quad 2 \quad 2 \quad 2 \quad 2$$
$$1 \quad 1 \quad 2 \quad 0 \quad 1 \quad 4 \quad 3 \quad 2 \quad 2 \quad 2 \quad 3 \quad 4$$

(8) 13. Consider two concentric circles of radii 4 centimeters and 11 centimeters and the central angle of 50 degrees. Find the perimeter and area of the region subtended by this angle and between the two circles. **Show your work.**

(10) 14. Suppose y varies jointly with x and z^2. If $y = 100$, when $x = 5$ and $z = 2$, find y for $x = -3$ and $z = 4$. Note: Show your work including the model.

(8) 15. A bag contains 5 red balls numbered one through five and 6 blue balls numbered one through six. Suppose two balls are chosen in random without replacement. What is the probability that the first ball is a one and the second ball is red? Note: You must explain your work through words and/or formula(s).

(10) 16. Use the Huntington-Hill method to apportion 11 representatives among Arizona, New Mexico, and Nevada. The populations of the states are Arizona, 5.2 million; New Mexico, 2.0 million; and Nevada, 2.1 million. Begin by giving one representative to each state. List the order in which the representatives are apportioned. **Show your work.**