Contemporary Mathematics
Math 1030
Sample Exam II – Chapters 7, 9 & 10
Time Limit: 90 Minutes   No Scratch Paper   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 on problems 1 & 2. Work neatly.

(10) 1. Fill in the blanks.

   (a) The sum of interior angles of a 7-sided convex polygon is _____ degrees.

   (b) If $2^x = \frac{1}{8}$, then $x =$ _____ .

   (c) The APR for 6% annual interest compounded monthly is _____ %.

   (d) If $y = k\,x$, the y varies _____ as x.

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

(3) 2. True or False.

(   ) (a) If $2^x = \frac{1}{8}$, then $x = \frac{1}{3}$.

(   ) (b) The area of triangle with sides 2 , 5 and 8 is 15 .

(   ) (c) The total accumulation of a $1000 investment earning 8% interest compounded semiannually after 6 months is $1040 .

(7) 3. Find the distance labeled x in the following. **Show your work.**
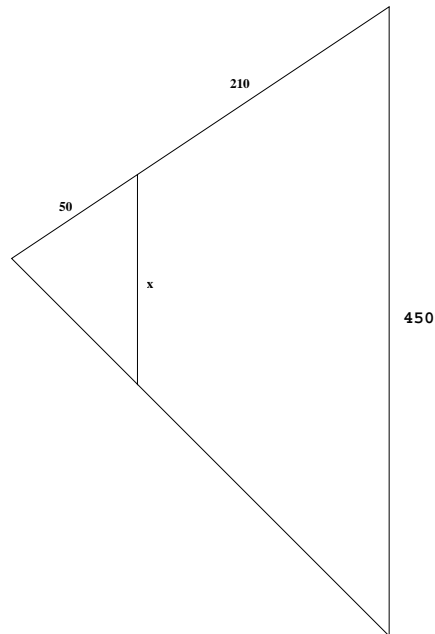
(7) 4. For how long shall we invest \$300 per month in an ordinary annuity earning 6% annual interest compounded monthly in order to accumulate a total of \$40,000? **Show your work.**

(8) 5. 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.**

(5) 6. Suppose the distance of ball from ground at time t seconds is $d = -16t^2 + 50t + 30$. Find the maximum distance of this ball from the ground. At what time, will this ball hit the ground? **Show your work.**

(7) 7. What will be your monthly payments if you borrow $175,000 through a 15-year mortgage with 5% annual interest rate, compounded monthly? **Show your work.**

(5) 8. Suppose a population grows logistically with the initial growth rate of 5%. If after 4 years the population size is 50% of its maximum size, find the percentage of the maximum size the population size will reach after 6 years? Note: Show your work including the model.

(8) 9. Consider two concentric circles of radii 5 centimeters and 10 centimeters and the central angle of 75 degrees. Find the perimeter and area of the region subtended by this angle and between the two circles. **Show your work.**

(7) 10. Suppose y varies jointly with x and z^2. If $y = 100$, when $x = 5$ and $z = 2$, find y for $x = -3$ and $z = 4$. **Show your work.**

(7) 11. Suppose \$5000 is invested at an account earning 5% annual interest compounded monthly. How much will be the total accumulation after 10 years? **Show your work.**

(6) 12. The period, T, of a grandfather clock pendulum varies directly with the square root of its length, $L^{0.5}$. If the period is 1 second when the pendulum length is 25 centimeters, what it the period if the length is 35 centimeters? Note: Show your work including the model.

(10) 13. Suppose U.S. population grows exponentially. If the U.S. population was 10 million in the year 1820 and 60 million in the year 1890, find an equation modeling the U.S. population. According to your model, at what year U.S. population was expected to reach 300 million? Note: Show your work including the model.

(10) 14. Find the x- and y-intercepts and vertex of the parabola $y = 9x^2 - 18x - 16$ and draw its graph. **Show your work.**

Formulas

$$y = a\left(b^x\right), \quad \log_b u^p = p \log_b u$$

$$P_{n+1} = [1 + r(1 - P_n)]P_n$$

$$A = P\left(1 + \frac{r}{m}\right)^{mt}, \quad A = R\frac{\left(1 + \frac{r}{m}\right)^{mt} - 1}{\frac{r}{m}}, \quad P\left(1 + \frac{r}{m}\right)^{mt} = R\frac{\left(1 + \frac{r}{m}\right)^{mt} - 1}{\frac{r}{m}}$$

$$\frac{(n-2) \times 180°}{n}, \quad (n-2) \times 180°$$

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

$$C = 2\pi r, \quad A = \pi r^2, \quad S = 4\pi r^2, \quad V = \tfrac{4}{3}\pi r^3$$

$$A = l\,w, \quad A = \tfrac{b_1 + b_2}{2}h, \quad V = \text{Area of base} \times \text{Height}$$

$$S = 2\pi rh + 2\pi r^2, \quad V = \pi r^2 h$$

$$S = \pi r\sqrt{r^2 + h^2}, \quad V = \tfrac{1}{3}\pi r^2 h$$