

## REVIEW TEST 3 – 8.5, Chapters 9, 10, 11

To prepare for the test, you may study the following:

- Quiz #3
- Homework Chapters 8 , 9
- All examples done in class

### More practice

#### **Section 8.5**

24) Solve the following inequalities. Write the solution set in interval notation:

- a)  $x^2 - 6x - 7 \leq 0$ ;                      b)  $6x - x^2 \geq 7$ ;                      c)  $x(2-3x)(x-3) \geq 0$ ;                      d)  $\frac{3}{x+3} > \frac{5}{x-2}$ ;
- e)  $-x(x+1)^2(x^2+5x+6)(2x^2+3x+10) > 0$

### **More practice applications Chapter 8 (for final exam)**

25) Hortense is investing \$2600 in an account where interest is calculated according to the formula  $A = P(1+r)^t$  where P is the original principal, r is the interest rate and t is the time measured in years. If Hortense wants her money to grow to double in two years, what interest rate must the account have? (Approximate the answer to the nearest hundredth of a percent) (A: 41.42% )

26) Earl borrowed \$5500 from his uncle for 2 years with interest compounded annually according to the formula  $A = p(1+r)^t$  where “p” is the original principal, “r” is the interest rate and “t” is the time measured in years. At the end of 2 years he owed his uncle \$6474.74. What was the interest rate on the loan? (A: 8.5% )

27) When Maria serves in volleyball, the ball leaves her hand with an upward velocity of 20 feet per second. The height “h” of the volleyball above the ground after “t” seconds is given by:  $h = -16t^2 + 20t + 5$ .

- a) If nobody hits the ball, how long will it take the ball to hit the ground? (A: 1.46 sec)
- b) If nobody hits the ball, how long will it take the ball to reach its initial height again? (A: 5/4 sec)

28) The fish population in a certain lake rises and falls according to the formula:

$$F = 2000 \left( 15 + \frac{17}{2}t - \frac{1}{2}t^2 \right).$$

Here “F” is the number of fish at the time “t” where “t” is measured in years since January 1, 1997 when the fish population was first estimated.

- a) On what date will the fish population again be the same as on January 1, 1998?
- b) By what date will all the fish in the lake have died? (Approximate your answer in years to one decimal place).

1) Find the domain of each function:

a)  $f(x) = \log_{10}(12 - 4x)$ ;      b)  $g(x) = \ln(x^2 - 25)$ ;      c)  $h(x) = \log\left(\frac{3-4x}{x+2}\right)$

2) Simplify:

a)  $\log_2(\log_4 16)$       b)  $\log_{10}(\log_3(\log_5 125))$       c)  $2^{\log_2 5} - 3\log_5 \sqrt[3]{5}$

3) Find the following:

a)  $\log_3 27$       b)  $\log_4 \frac{1}{16}$       c)  $\log_{1/2} 8$       d)  $\log_2 \sqrt{2}$   
 e)  $\log_2(\log_4 16)$       f)  $\log(\ln e)$       g)  $\log(\log_3(\log_5 125))$       h)  $\log 70 - \log 7$   
 j)  $\frac{\log_3 81 - \log_p 1}{\log_{2\sqrt{2}} 8 - \log 0.001}$       k)  $(\log_2 10)(\log 2)$       l)  $5e^{\ln(A^2)}$       m)  $\ln(e^{2ab})$

4) Expand as much as possible. Simplify the result if possible. Assume all variables represent positive real numbers

a)  $\log_3 \frac{4p}{q}$       b)  $\log_5 \frac{5\sqrt{7}}{3}$       c)  $\log_6(7m + 3q)$       d)  $\log_m \sqrt{\frac{5r^3}{z^5}}$   
 e)  $\log_3 \frac{\sqrt{x} \cdot \sqrt[3]{y}}{w^2 \sqrt{z}}$       f)  $\ln \frac{5x\sqrt{1+3x}}{(x-4)^3}$

5) Write as a single logarithm with coefficient 1. Assume all variables represent positive real numbers

a)  $\log_a x + \log_a y - \log_a m$       b)  $2\log_m a - 3\log_m b^2$       c)  $\log_b(2y + 5) - \frac{1}{2}\log_b(y + 3)$

6) Let  $f(x) = 1 - 2x$  and  $g(x) = \frac{2-x}{x+3}$ . Answer the following questions:

a) Find  $(g \circ f)(x)$ .      b)  $(f \circ g)(2)$       c) Find  $f^{-1}(x)$ .      d) Find  $g^{-1}(x)$ .

7) Simplify the following expressions.

a)  $4\ln x + 7\ln y - 3\ln z$       b)  $\frac{1}{2}(\log_5 x + \log_5 y) - 2\log_5(x + 1)$   
 c)  $\log_3 405 - \log_3 5 + \log 5 + \log 2$       d)  $\log_4(\log_2 16)$

8) Graph  $f(x) = 3^x$  and  $f^{-1}(x) = \log_3 x$  on the same coordinate system showing the symmetry about the bisector line  $y = x$ . Label the axes and all the points.

9) Graph the function  $f(x) = 4^x$ . Label the axes and show clearly how you graph (label all the points you use).

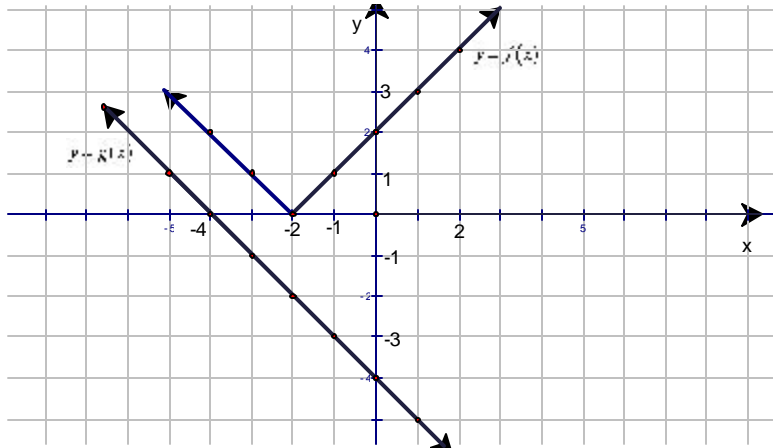
Answer the following questions:

- a) What is the domain of  $f$ ?      b) What is the range of  $f$ ?      c) What is the y-intercept?  
 d) What is the x-intercept (if any)?      e) Does the graph have an asymptote? What kind? What is its equation?  
 f) If this function one-to-one? Explain.      g) Does  $f$  have an inverse? Why?

h) What is the inverse function (Do not prove). i) Show on the above coordinate system how you obtain the graph of  $f^{-1}$  from the graph of  $f$ . That is, sketch the graph of  $f^{-1}$  showing the symmetry about the line  $y = x$ .

10) Repeat all questions from 9) for a)  $f(x) = \log_2 x$ ; b)  $g(x) = \ln x$

11) Use the graphs of  $f$  and  $g$  to evaluate each composite function.



a)  $(f \circ g)(-1)$

b)  $(g \circ f)(0)$

12) Solve all the equations:

a)  $\log_5(3x-1) - 2 = 0$

b)  $\log_7(x+4) - \log_7 3 = 1$

c)  $4^x = 20$

d)  $3 - \log_5(2-x) = 5$

e)  $40e^{0.6x} - 3 = 237$

f)  $\log_4(x+3) = 2$

## Chapter 10 – Conic Sections

1) Let  $2x^2 + 3x + 2y^2 - y - 2 = 0$  be the equation of a circle. Find the center and radius of the circle.

2) a) Find the distance between the points  $(1, -7)$  and  $(-8, -2)$ .

b) Find the midpoint of the line segment with these two endpoints.

3) a) Write the standard form of the equation of the circle with center  $(5, -6)$  and radius 10.

b) Find the exact  $x, y$  – intercepts.

4) a) Graph the following equation:  $9x^2 + 16y^2 = 144$

Answer the following:

b) What is the center of the ellipse? c) What is the major axis and what is its length?

d) What is the minor axis and what is its length? e) What are the coordinates of the vertices?

f) What are the coordinates of the foci?

$$5) \begin{cases} x^2 + y^2 = 9 \\ 4x^2 + 25y^2 = 100 \end{cases}$$

- a) First, solve the above system graphically; that is, identify each equation and graph it. Highlight the solutions of the system on the graph. Make sure you label the axes and every point you are using in graphing the curves.
- b) Second, solve the above system algebraically, showing the exact solutions.

6) Find the center and radius of the following circle:  $x^2 + y^2 + 6x + 2y + 6 = 0$ . Then find the exact intercepts( if any).

7) Graph  $9x^2 - 4y^2 = 36$ . Show all work. Identify the following: Type of curve, Center, Vertices, Foci, Equations of the asymptotes

### Chapter 11 – Sections 11.1 & 11.4

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1) Use the Binomial Theorem to expand the following:

a)  $(x + y)^7$                       b)  $(a + 2b)^4$                       c)  $(2x - 1)^5$

2) Find the following:

a)  $4!$                       b)  $\frac{15!}{18!}$                       c)  $\binom{8}{3}$                       d)  ${}_{10}C_6$

3) Find the first four terms of each sequence:

a)  $\begin{cases} a_n = 3a_{n-1} - 2 \\ a_1 = 5 \end{cases}$                       b)  $\begin{cases} a_n = 2(a_{n-1} - 3) \\ a_1 = 1 \end{cases}$                       c)  $a_n = \frac{n^3}{(n-1)!}$

4) Find each sum and simplify :    a)  $\sum_{i=2}^5 \frac{i!}{(i+1)!}$     b)  $\sum_{n=1}^4 nx^{n-1}$     c)  $\sum_{i=1}^3 \frac{(i+2)!}{i!}$     d)

$$\sum_{k=0}^5 \binom{5}{k}$$