Name_____ Date_____

MAT 150 Dual Credit Practice Final

1. Given the function $(x) = 4x^5 + 5$, find $f^{-1}(x)$.

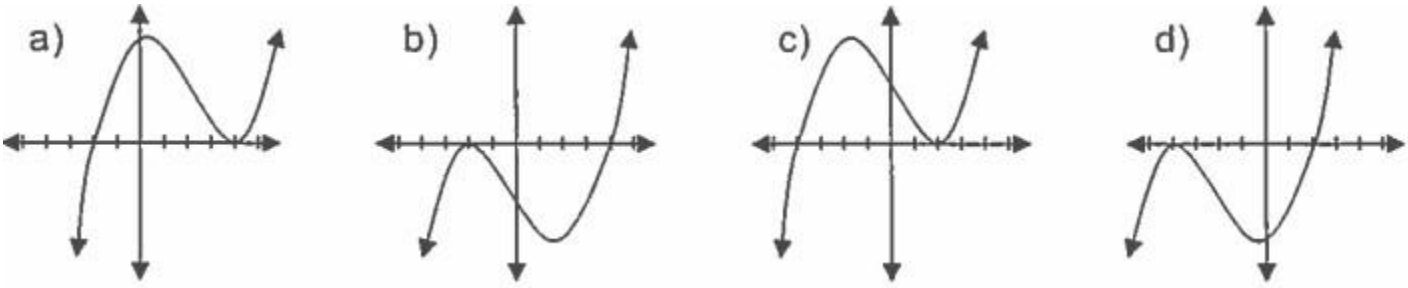
2. Let f$(x) = 3x + 4$ and $g(x) = 2x - 3$. Find f$(g(x))$.

3. Find the vertical asymptote(s) of the graph of the function f$(x) = \frac{x+9}{x^2+9x+20}$

4. Find the domain and range of the function $f(x) = \sqrt[2]{x-4}$

5. Write $log\,(2x + 7) = 8$ in simplified exponential form.

6. Which of the following could be the graph of a polynomial function that has a zero at x=4 with multiplicity 4 and a zero at x= - 2 with multiplicity 1?



7. The equation $s = -30t^2 + 120t + 5$ models the height, *s*, of a ball in feet *t* seconds after it's thrown into the air. Determine the maximum height the ball will reach.

8. If $3500 is invested at 2.5% interest compounded continuously, how long will it take (to the nearest tenth) to double?

9. Using the vertical line test, sketch three graphs that show *y* as a function of *x*.

10 Given the function $f(\boldsymbol{x}) = \boldsymbol{x^2} - 12\boldsymbol{x} + 20$ determine the following.

a. The vertex is _____

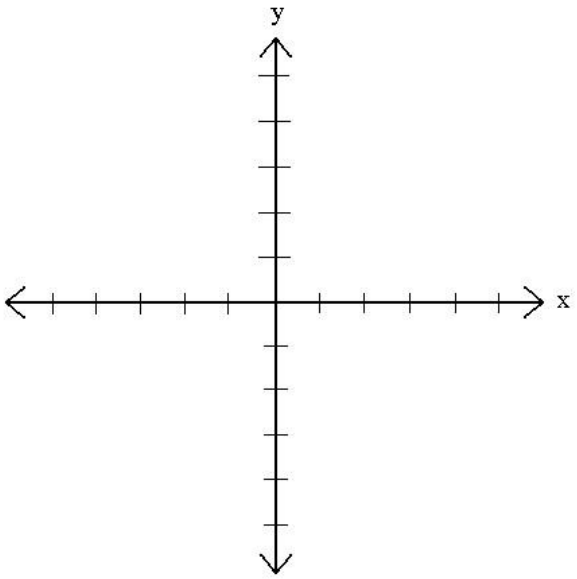
b. List the x-intercept(s), if any, as ordered pairs _____

c. List the y-intercept(s), if any, as ordered pairs _____

d. The domain is _____

e. The range is _____

f. Sketch the graph. Label the points (parts a-c) on the graph as ordered pairs.



11 **Given the function f(x) = $2^{x+2}+1$ determine the following.**

a. List the x-intercept(s), if any, as ordered pairs _____

b. List the y-intercept(s), if any, as ordered pairs _____

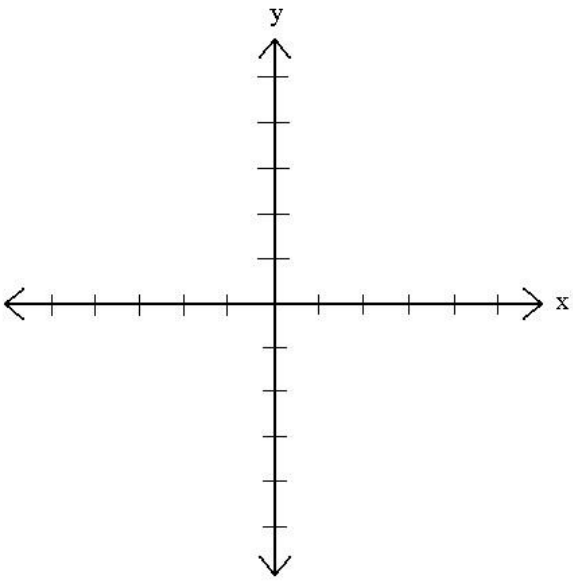
c. There is/are vertical asymptote(s), if any, at _____

d. There is/are horizontal asymptote(s), if any, at _____

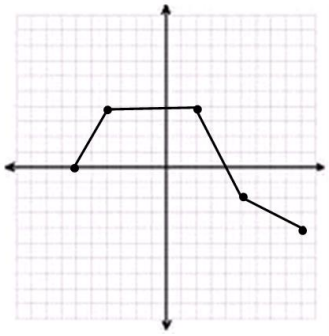
e. The domain is _____

f. The range is _____

g. Sketch the graph. Label the points (parts a-b), as ordered pairs, and any asymptote(s) on the graph.



12. Use the graph of $y = f(x)$ shown below to determine the following.



a. The domain of $y = f(x)$ is _____
b. The range of $y = f(x)$ is _____
c. $f(1)$ = _____
d. When $f(x) = -2$, x = _____
e. Give the interval over which the function is increasing _____
f. Give the interval over which the function is decreasing _____
g. Give the interval over which the function is constant _____

Determine the domain of each function

13. $f(x) = \log(x + 3)$

_____

14. $f(x) = \frac{x+9}{x^2-9}$

_____

15. $f(x) = -2x^2 - 4x + 12$

_____

Solve for the variable. Remember to check your answer.

16. $2x^3 + 14x^2 + 24x = 0$

17. $\frac{1}{x+3} - \frac{2}{x-4} = \frac{5}{x^2-x-12}$

18. $9^x = 27^{x-5}$

19. $9e^{6x} = 144$

20. $\log_5(7x - 6) = 4$

21. $\log x + \log (x - 4) = \log 5$

22. $3|2x + 3| + 2 \geq 20$ Write the solution in interval notation.

23. $4x = 58 - 7y$

$5x - 26 = -y$

Write the solution as an ordered pair.

24. Use the given piecewise function to determine the below. $f(x) = \begin{cases} \frac{x^2 - 36}{x - 6} & \text{if } x \neq 6 \\ 2 & \text{if } x = 6 \end{cases}$

a. $f(4) =$

b. $f(6) =$

c. $f(9) =$

Perform the following combinations of functions

25. **Given** $f(x) = 2x - 4$ **and** $g(x) = x - 5$ **find** $(f - g)(x)$

26. **Given** $f(x) = 3x^2 - x + 2$ **and** $g(x) = 2 - x^2$ **find** $(fg)(x)$

27. Find the inverse of the following equation**:** $f(x) = \frac{4}{8x+5}$

28**.** Suppose that you have $15000 to invest. Which investment yields the greater return over 5 years: 1) 5% compounded monthly or 2) 4.75% compounded continuously?

(You must show your work for the calculations of both investments)

29. A toy rocket is launched from the top of a 90-foot tall building at an initial velocity of 225 feet per second. The function $s(\boldsymbol{t}) = \boldsymbol{-16t^2 + 225t + 90}$ models the rocket's height above the ground, s(t), in feet, t seconds after it was launched. After how many seconds will the rocket hit the ground? (Round to the nearest tenth)

30. When a person receives a drug injected into a muscle, the concentration of the drug in the body (measured in milligrams per 100 milliliters), is a function of the time elapsed after the injection (measured in hours). The graph of this scenario/model is shown. Find the average rate of change in the drug's concentration between 1 and 5 hours.