

Final exam Review
Math 175

Solve the following equations:

1. $\log_2 x + \log_2(x-7) = 3$

2. $2e^{2t-1} = 12$

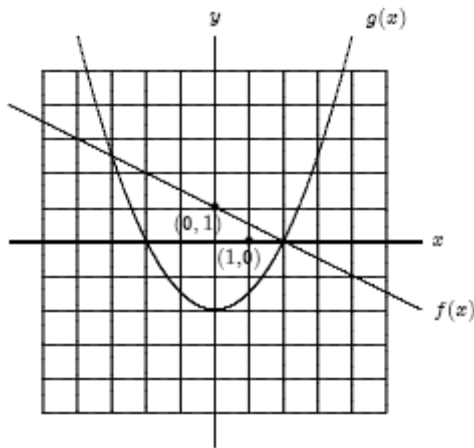
3. $3^x - 5 = 4$

4. $8^x = 3^x$

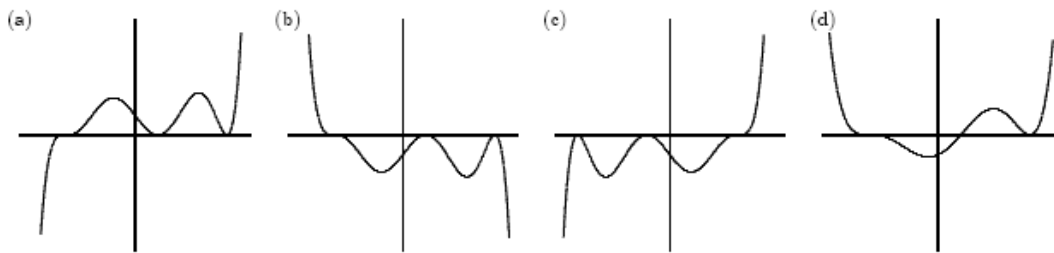
5. $\log 3x = 2$

6. $\frac{5}{x+3} = \frac{7}{x-2}$

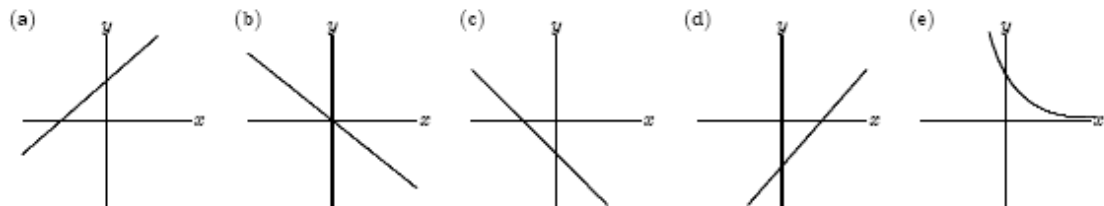
5. Use the graph below to solve $f(x) < g(x)$.



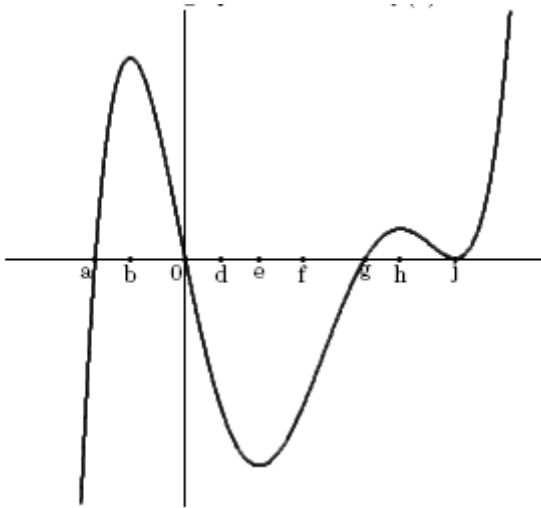
6. Which of the following best represents the graph of $p(x) = (x-4)^2(x+15)^5(x-21)^{12}$?



7. Which of the following best represents the graph of $y = mx + b$, where $m > 0$, and $b < 0$?



8. Consider the graph of a function $f(x)$ shown below:



- On what interval(s) is $f(x)$ increasing?
- On what interval(s) is $f(x)$ decreasing?
- At what values of x does $f(x)$ attain a local maximum value?
- At what values of x does $f(x)$ attain a local minimum value?
- Find the x -intercept(s) of $f(x)$.
- Find the y -intercept(s) of $f(x)$.

Find the domain for the following functions:

9. $f(x) = \sqrt{x+2}$

10. $g(x) = \frac{x}{x^2 + 5x + 6}$

11. $h(x) = 4x^5 - 5x$

12. $h(x) = \ln x + 3$

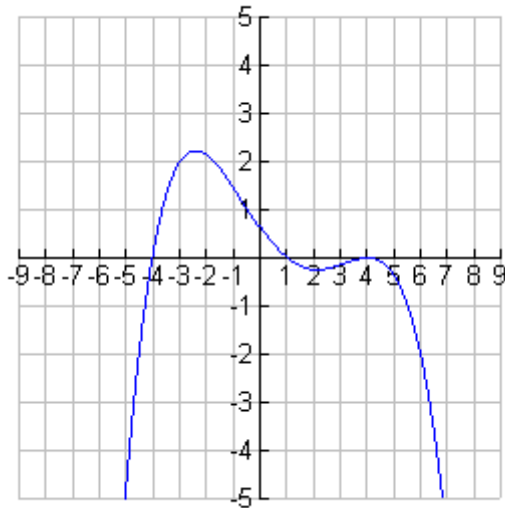
13. Find the vertical and horizontal asymptotes for the graph of $h(x) = \frac{x^2 - 3}{x^2 - x - 20}$

14. The graph of $f(x) = \frac{-2}{x+3}$ is obtained from the graph of $y = \frac{1}{x}$ by:

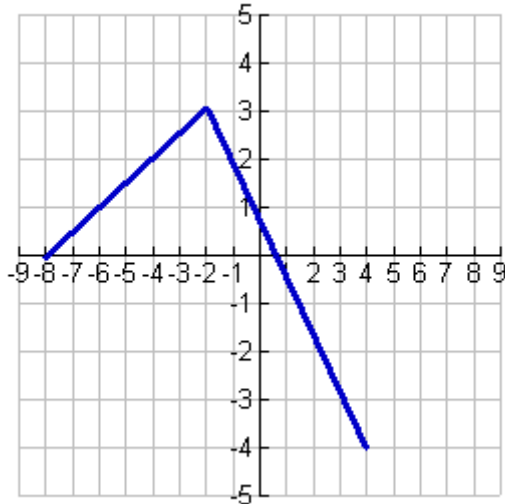
- Shifting left 2 units and down 3 units
- Shifting right 3 units and down 2 units,
- Reflecting across the x -axis, shifting left 3 units and stretching vertically by a factor of 2
- Reflecting across the x -axis, shifting right 3 units and stretching vertically by a factor of 2
- Reflecting across the y -axis, shifting left 2 units and stretching vertically by a factor of 2

15. If $f(x) = \frac{1}{2}x - 6$, find $f^{-1}(-4)$

16. Find a possible function for the polynomial function graphed below.



17. Use the graph of f below to answer the following questions:



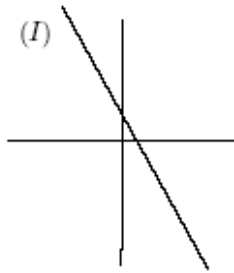
- What is the domain of f ?
- What is the range of f ?
- Does f have an inverse?
- Find all values of x , if any, for which $f(x) = 2$

18. This question concerns the tables given below.

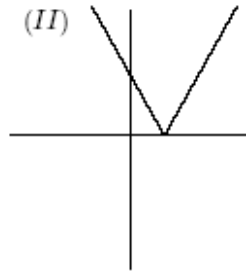
x	f(x)	x	g(x)	x	h(x)
10	112	-2	16	-3	-3
15	98	-1	24	-2	0
20	84	0	36	-1	1
25	70	1	54	0	0
30	56	2	81	1	-3

One of the tables of data comes from a linear function, one from an exponential function and one from a quadratic function. Identify which is which and explain how you know.

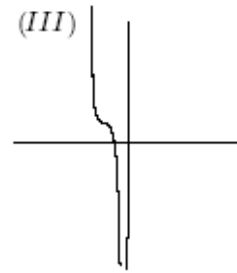
19. For each of the graphs below, select the formula beneath the graph which best fits the behavior of the graph. In each case, assume that A, B, and C are positive real numbers.



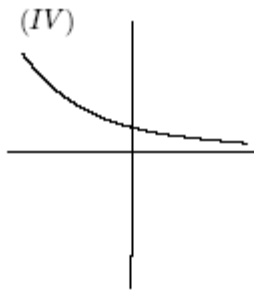
- (a) $y = Ax + B$
- (b) $y = -Ax - B$
- (c) $y = B - Ax$
- (d) $y = (x + A)/(x + A)$



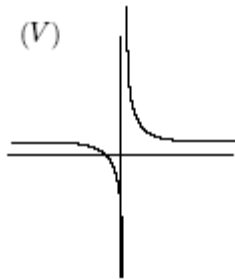
- (a) $y = |x - A|$
- (b) $y = |x + A|$
- (c) $y = |x| - A$
- (d) $y = |x| + A$



- (a) $y = -Ax^5 + B$
- (b) $y = Ax^3 + B$
- (c) $y = -A(x + B)^5 + C$
- (d) $y = A(x + B)^5 + C$

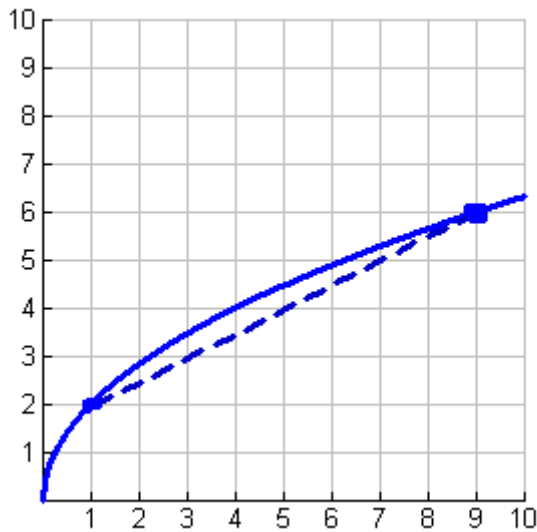


- (a) $y = -\ln(x + A)$
- (b) $y = (1/A)^x$
- (c) $y = -A^x$
- (d) $y = -e^x$



- (a) $y = A(x - B)/(x + C)$
- (b) $y = -A(x - B)/(x + C)$
- (c) $y = A(x + B)/(x - C)$
- (d) $y = -A(x + B)/(x - C)$

20. Determine the average rate of change for the function between the indicated values of the variable.



Divide using synthetic division or long division.

21. $\frac{x^3 + 3x - 36}{x + 2}$

22. $\frac{12x^3 + 15x^2 + 21x}{3x^2 + 4}$

23. Find all the zeros of P, real and complex: $P(x) = x^4 + 36x^2$

24. Find the polynomial with the following zeros, $\{3, 2i\}$

Evaluate the expressions below:

25. $\log_3 189 - \log_3 7$

26. $\log_5 \sqrt[5]{625}$

27. Use the Laws of Logarithms to expand the expression $\log_4(x(x-9))$

28. Graph the following function $g(x) = \begin{cases} x+6 & \text{if } x \leq 0 \\ x^2+4 & \text{if } x > 0 \end{cases}$

Evaluate the expression and write in the form $a + bi$

29. $(2 - 3i) - (1 + 4i)$

30. $(2 + i)((3 - 2i)$

31. $4i(3-2i)$

32. $\frac{4+2i}{2-i}$

33. i^{23}

34. $\sqrt{-10} \cdot \sqrt{-40}$

29. Solve the following systems of equations using any method.

a.
$$\begin{aligned} 2x + 5y &= 2 \\ -5x - 13y &= 20 \end{aligned}$$

b.
$$\begin{aligned} x + y - z &= -4 \\ 2x - 3y - z &= 5 \\ x + 2y + 2z &= 3 \end{aligned}$$

30. Solve the following system using Cramer's rule. Write the solutions in determinant form and evaluate the determinants.

$$4x - y + 3z = -3$$

$$3x + y + z = 0$$

$$2x - y + 4z = 0$$

31 Identify each conic:

a. $2x^2 + 3y^2 + 12x - 24y + 60 = 0$

b. $9x^2 - y^2 - 36x - 6y + 18 = 0$

c. $y + x^2 - 7 = 0$

d. $x^2 + y^2 - 10x + 4y + 13 = 0$

32. Find the sum of $\sum_{n=1}^5 2 \cdot 4^{n-1}$

33. How many numbers between 50 and 500 are divisible by 8?

34. Expand $(3x+4)^5$ using the Binomial Theorem