

***Part I. Problems in this section are mostly short answer and multiple choice.
Little partial credit will be given. 5 points each.***

1. Factor completely.

a) $20x^2 + 18x - 18$

b) $x^3 + x^2 - 4x + 4$

2. Find the domain of the function $g(x) = \sqrt{x-2}$.

a) $(-\infty, \infty)$

b) $(-\infty, 2)$

c) $(-\infty, 2]$

d) $(2, \infty)$

e) $[2, \infty)$

3. Use properties of logs to express as a single log.

$5\log_a x - \log_a(x+2)$

4. Find the quotient and remainder.

$(x^3 - 8) \div (x - 2)$

Quotient: _____

Remainder: _____

5. Let $f(x) = 2x - 4$ and $g(x) = x^2 + 2$.

a) Find and simplify $(f - g)(2)$.

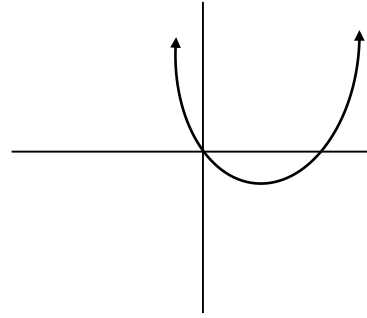
b) Find and simplify $g(f(x))$.

6. Solve: $\frac{7}{x-4} - \frac{3}{x+4} = \frac{10}{x^2-16}$

7. Find the linear function f such that $f(3) = -2$ and $f(2) = 5$.

$f(x) =$ _____

8. Given the graph of $f(x) = x^2 - 8x$, state all x such that
a) $f(x)$ is increasing (use interval notation)



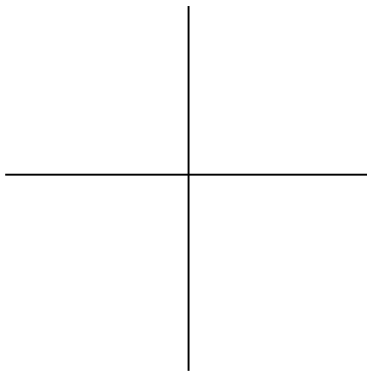
- b) $f(x) \geq 0$ (use interval notation)

9. Solve for x : $y = \frac{5}{3x-2}$

10. Solve algebraically: $|3x-2| > 8$

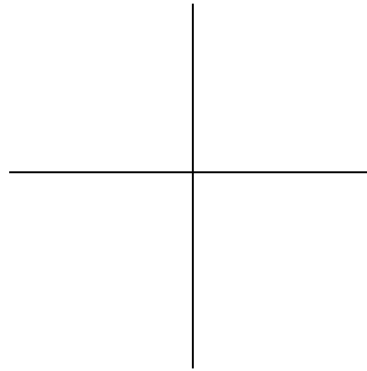
11. Graph each function. Label all intercepts and asymptotes.

$$f(x) = e^x + 2$$



Intercept in (x,y) form: _____
equation of asymptote: _____

$$g(x) = -\ln x$$



intercept in (x,y) form: _____
equation of asymptote: _____

12. Evaluate each.

a) $\log_4 64 =$ _____

c) $\log(0.001) =$ _____

b) $\log_9 3 =$ _____

d) $\ln e^{12} =$ _____

e) $\log_2 1 =$ _____

13. Find a formula for the inverse given $f(x) = \sqrt[3]{\frac{2x-1}{5}}$.

$f^{-1}(x) =$ _____

14. Write a polynomial of degree 4 that has 0 as a zero of multiplicity two, -1 and 3 as zeros with multiplicity 1. Write in polynomial form (multiplied out)

Part II. There are 9 problems in this section. Partial credit will be awarded. Show all work. 11 pts. each.

15. Solve: $x^4 - x^2 - 12 = 0$ (Include real and complete solutions.)

Solution(s): $x =$ _____.

16. Given the function $f(x) = x^2 - 4x - 12$

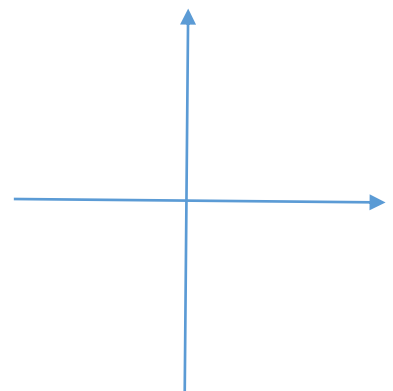
a) State the y-intercept.

b) state the zeros of the function.

c) The vertex is (_____ , _____).

d) Maximum/minimum value = _____.

e) Graph. Label intercepts and vertex.



17. Given the function $f(x) = (x+2)^2(2x-3)(x+5)$

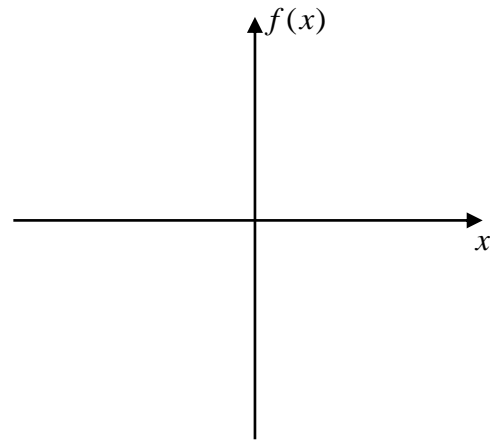
a) Find y-intercept.

b) Find zeros and state their multiplicities.

zero	multiplicity

c) Is $f(x)$ tangent to the x -axis?
If so, where?

c) Draw ending behavior.



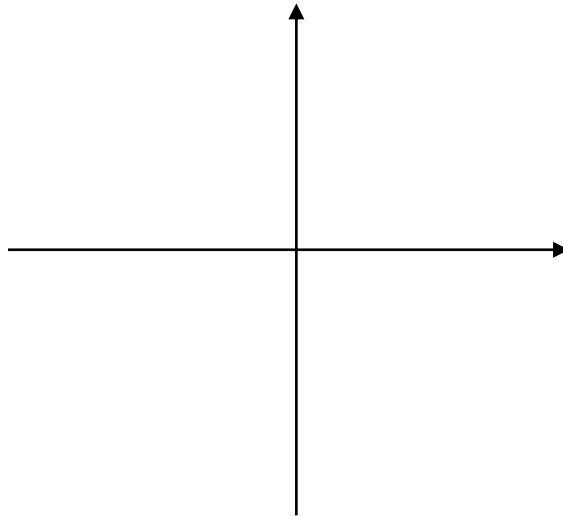
e) Sketch graph. Label all intercepts.

18. Given the polynomial $g(x) = x^3 - 4x^2 + 7x - 6$

a) state all possible rational zeros.

b) Find all zeros (real and complex.)

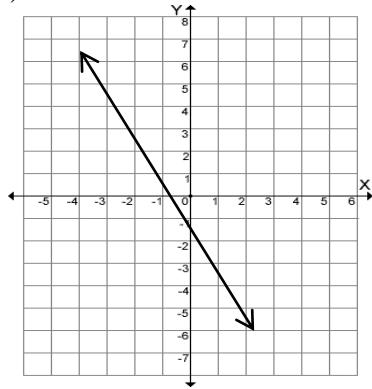
19. Find all asymptotes, x -intercepts, and y -intercepts for the graph $f(x) = \frac{4x-1}{x+2}$.
- a) The equation of the vertical asymptote(s) is/are $x = \underline{\hspace{2cm}}$.
 - b) The equation of the horizontal asymptote(s) is/are $y = \underline{\hspace{2cm}}$.
 - c) The x -intercept is at the point $\underline{\hspace{2cm}}$.
 - d) The y -intercept is at the point $\underline{\hspace{2cm}}$.
 - e) Sketch the graph of $f(x)$. **Label all intercepts and asymptotes.**



20. Solve the system algebraically.
- $$2x - 3y = 5$$
- $$3x + y = -9$$

21. For each line, give the slope and y-intercept. Give the equation where indicated.

a)

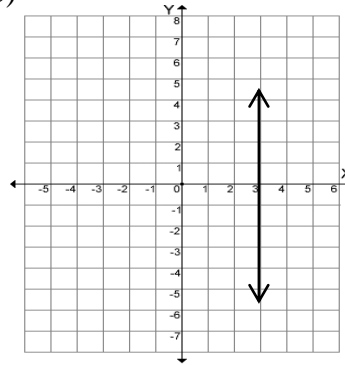


Slope:

y-intercept:

Equation of line:

b)



Slope:

y-intercept:

Equation of line:

c) $5x - 6y = 12$

Slope:

y-intercept:

22. Solve for x .

a) $\log_2(2x-1) = 4$

b) $3 \cdot 9^{2x-3} = \frac{1}{27}$

23. Solve $\sqrt{3x+24} = x+2$. Check all solutions.

Part III. There are 6 problems in this section. Choose any 4. Indicate in the boxes the problems you want graded. 8 points each.

Grade? 24. The amount of money in an account t years after invested is given by: $A = 500e^{0.03t}$. Find the amount time it would take the amount to reach \$1500. Leave your answer in exact form since no calculators are allowed. Include units on answer.

Grade? 25. The points $(-1, 7)$ and $(3, 1)$ are the endpoints of the diameter of a circle.

a) State the center and the radius.

b) State the equation of the circle in standard form.

Grade 26. A stone is thrown directly upward. The height of the stone t seconds after it has been thrown is given by $s(t) = -16t^2 + 48t + 5$ ft. Show your work algebraically and Include units on answers.

a) What is the initial height of the stone?

b) Find the time it takes for the stone to reach its maximum height.

c) Find the maximum height the stone reaches.

Grade 27. Solve $x(x-2) \geq 15$ algebraically. Express in interval form.

28. Simplify the difference quotient $\frac{f(x+h) - f(x)}{h}$ for $f(x) = 7x - x^2$.
Grade

29. Solve and check answers. $\log_3(x + 2) + \log_3(x) = 2$
Grade