Name _____ Quarter 2

Pre-Calculus Midterm - Review

1. If $f(x)=x^3+3x-2$, determine $f(x-3)$

2. If $h(x)=\sqrt{x-9}$, $f(x)=x+3$, and $g(x)=2x^2$ find and expression for $(f\circ h\circ g)(x)$

3. Evaluate $\frac{f(x+h)-f(x)}{h}$ if $f(x)=x^2-2x+5$

4. Find the inverse of *f(x)* if $f(x)=\sqrt{2x+3}$

5. Write the equation of the line in point-slope, slope-intercept, and standard form that passes through the points (4,4) and (-7,2)

6. Express $\frac{12}{\sqrt{x+12}}$ as a composite of two or more functions

7. Show that f(x) and g(x) are inverses of each other. $f(x)=\sqrt{x+3}$ and $g(x)=x^2-3$

8. Simplify $\frac{2x^4}{x^3-x^2}$ completely. (Remember to write down any restrictions.)

9. Use the geometric definition of absolute value to find the solution set to the following.

   a. $|3-x|=4$

   b. $|5-2x|\geq 4$

10. Perform the indicated operation(s) and simplify. (Do not forget to write the restrictions.)

    a. $\frac{4-x^{-2}}{2x^{-1}-x^{-2}}$

    b. $\frac{x^2-xy}{xy+2y^3}\div\frac{x^2+xy}{xy+y^2}$

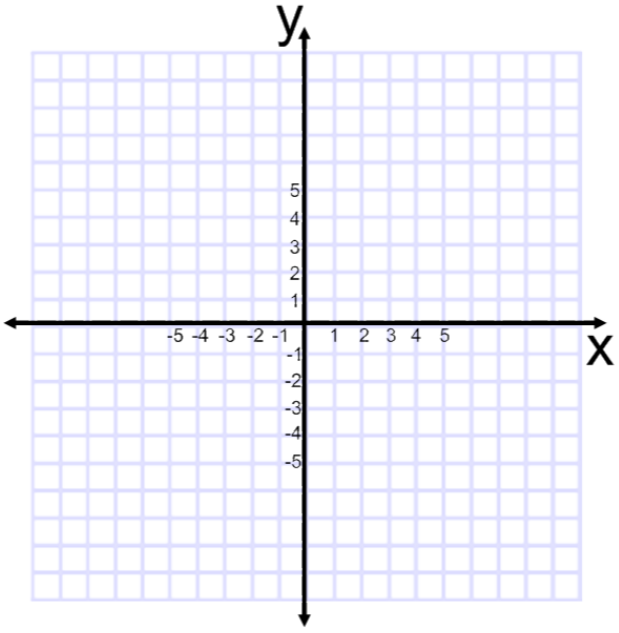
11. Solve inequality and express the solution set in (a) set builder notation and (b) interval notation.

$$\frac{x^2-4x-5}{(x-2)^2}>0$$

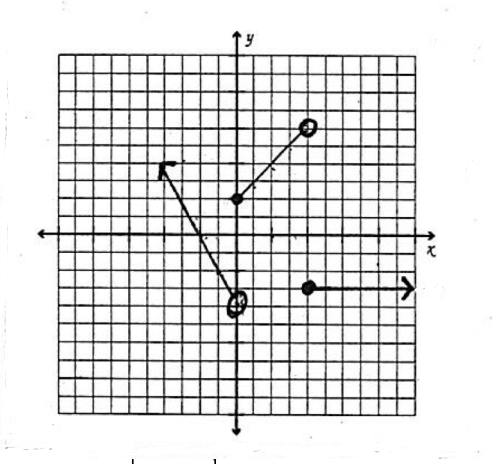
12. Write $f(x) = -x^2 + 4x + 6$ in vertex form.

13. Sketch the function **without** using a graphing calculator. Find the domain and range of each function.

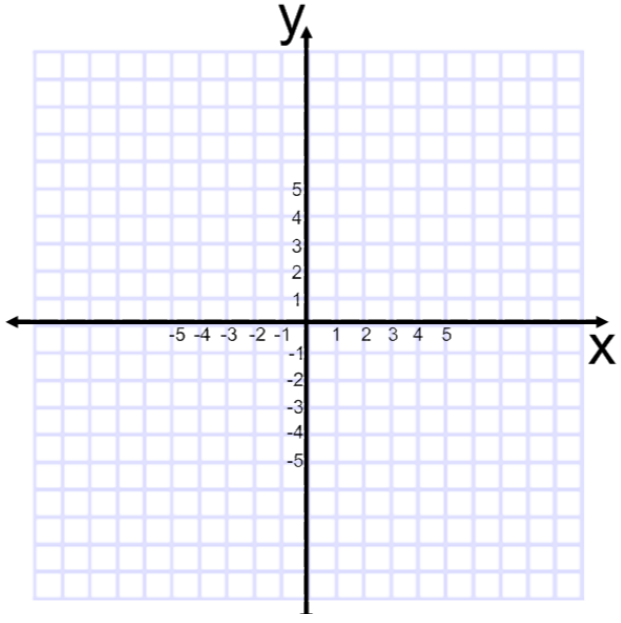
a. $$f(x) = \begin{cases} -x^2 + 4, & x \le 2 \\ \frac{1}{2}x - 3, & 2 < x < 4 \\ \sqrt{x-4}, & x \ge 4 \end{cases}$$



14. Write a piecewise function for the graph

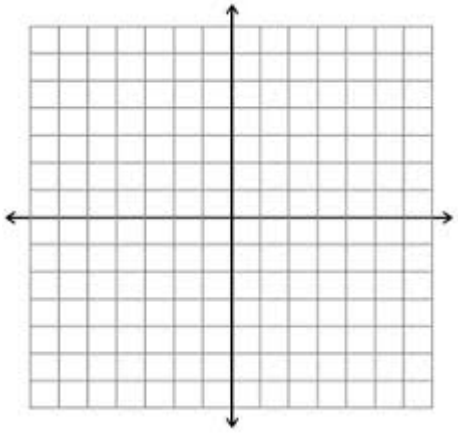


15. Use the algebraic definition of absolute value to rewrite $f(x) = |3x - 2| + 1$ as a piecewise function and then sketch each graph.

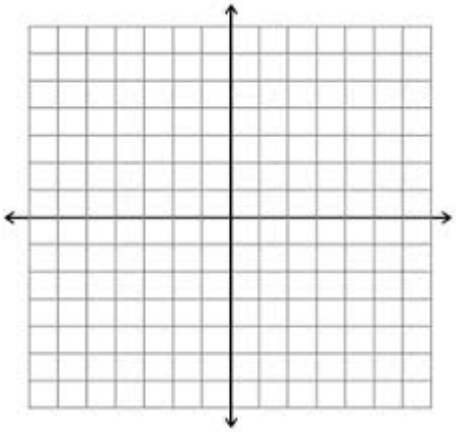


16. Describe each transformation in terms of the parent function and then graph the function. State the domain, range, and any x- or y- intercepts.

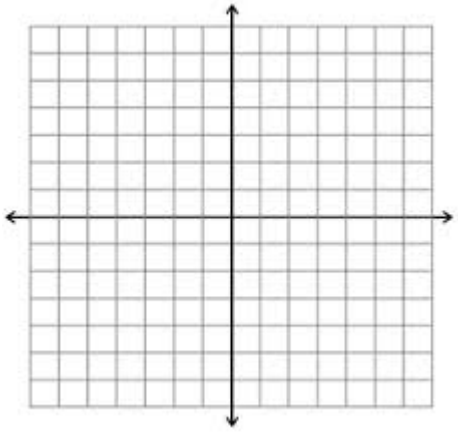
a. $f(x)=2-(x+3)^2$



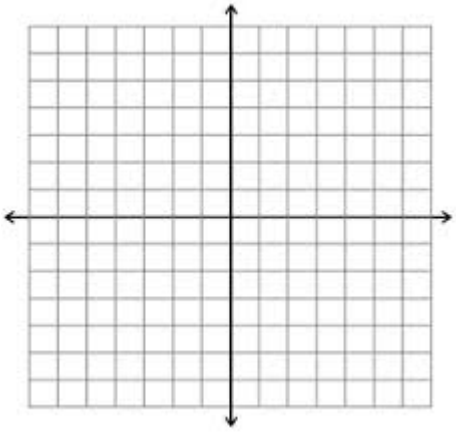
b. $f(x)=-|x-4|$



c. $f(x)=\sqrt{x-1}+5$



d. $f(x)=(-x)^3+3$



17. Determine algebraically if the following functions are even, odd, or neither

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

b. $f(x)=\dfrac{x^3}{x^2-4}$

18. Use polynomial long division to find the quotient of x^4-5x^2+6x-7 divided by x^2+2

19. Use synthetic division to find the quotient of $(x^4-5x+10)\div(x-3)$

20. Show that (x-3) is a factor of $P(x)=x^3-7x-6$, and find the other factors.

21. Determine if (x-2) is a factor of $f(x)=x^3-13x^2+23x-11$

22. List all of the possible rational roots for $f(x)=-3x^2+5x+4x^3-6$

23. What is the complete factorization of $f(x)=x^3-13x-12$

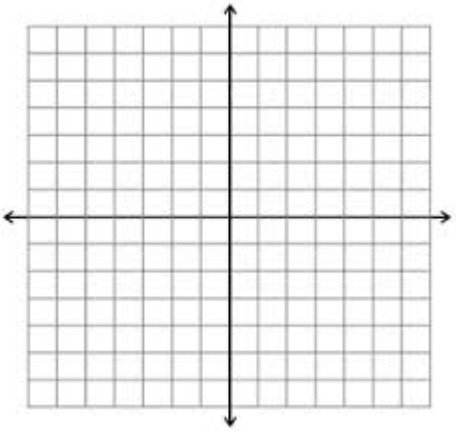
24. What are the roots of $f(x)=x^3-13x-12$

25. If (x-16) is a factor of f(x), then what is one of the zeros?

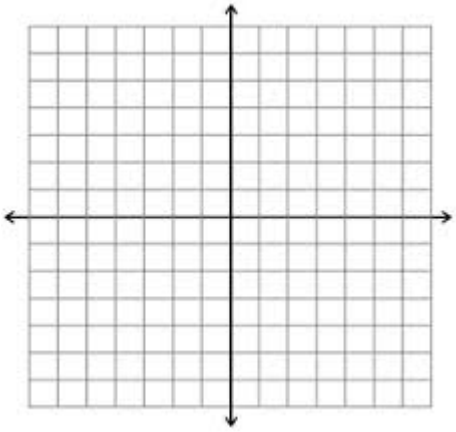
26. If f(5)=0, what is one of the factors of f(x)?

27. Graph the following using a minimum of 2 points. For each graph, state the domain, range, intercepts, and the equations of any asymptotes.

a. $y=-\frac{1}{(x+4)}+2$



b. $y=\frac{1}{(x-1)^2}-1$

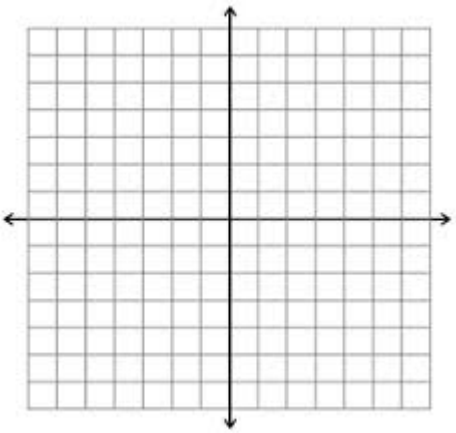


28. Fill in the chart:

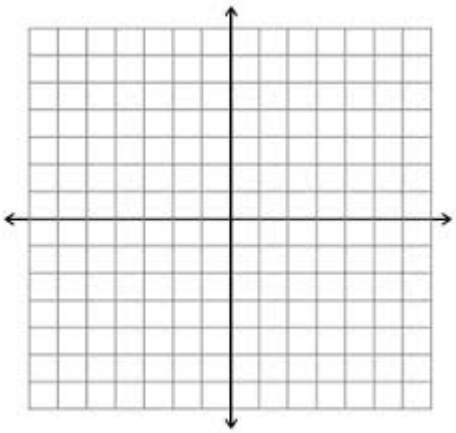
Function	Hole(s)	Vertical Asymptote(s)	Horizontal Asymptote	x-intercept(s)	y-intercept
$y=\frac{5-x}{x^2-25}$					
$y=\frac{2x^4}{x^3+x}$					

29. Graph the following using a minimum of 2 points. For each graph, state the domain, range, coordinates of any holes or intercepts, and the equations of any asymptotes.

a. $y=\frac{x^3-3x^2-3x+9}{3-x}$



b. $y=\frac{x+1}{x^2+4x+3}$



In 30 - 40, factor each completely if possible.

30. $x^3 - 3x^2 - 4x + 12$

31. $3x^2 - 75$

32. $ax^2 + 15 - 5ax - 3x$

33. $6x^2 - 11x - 10$

34. $x^4 - x^2 - 12$

35. $16x^2y^2 - 25$

36. $8x^3 - 125y^3$

37. $(x^2 - 3x)^2 - 38(x^2 - 3x) - 80$

38. $x^2(x^2 - 1) - 9(x^2 - 1)$

39. $4(x^2 - 1)^2 - 13(x^2 - 1) - 12$

40. $7x^2 + 10xy + 3y^2$