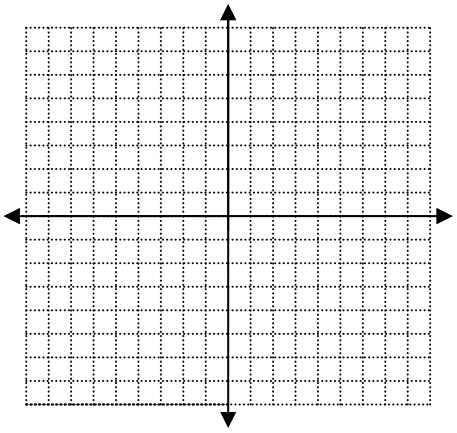
NAME:_____ **DATE:**_____

SEMESTER 1 EXAM REVIEW

Unit 1: Intro to Pre-Calc

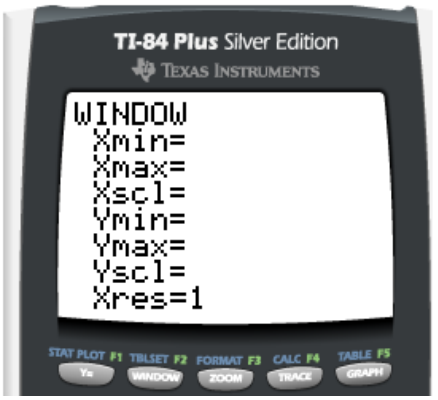
1. Linear Functions

Slope Intercept Form	Standard Form	Point Slope Form
a. Write the equation of the line in slope intercept form that is perpendicular to $y = 2x - 5$ and contains (-50,10)	b. Graph $3x + 2y = 10$ 	c. Write the equation of the line in point slope form that contains the points (-50,-49) and (35,53)

2. Regression (Best Fit Line/Curve)
The following table gives the number of motor vehicle thefts (in thousands) in the U.S. for the years 1983 - 1993. *x* = 1 represents 1983. Use the regression capabilities of your calculator to fit a cubic model to this data.

Year	1	3	4	7	8	9	10	11
Vehicle Thefts	1008	1103	1224	1565	1636	1662	1611	1561

a. Graph the data with a friendly window. Record here →



b. Use regression and write the equation of your model. (Round to three decimal places)

V(t) =

c. What does $V(5.5)$ mean? Find it.

d. Find the time(s) in which there will be1400 thousand auto thefts.

e. What does the *y*-intercept mean in this situation?

f. Predict the auto thefts in 1995.

3. Factoring Basics: Solve the following by factoring.

a. $x^2 - 9x = 0$

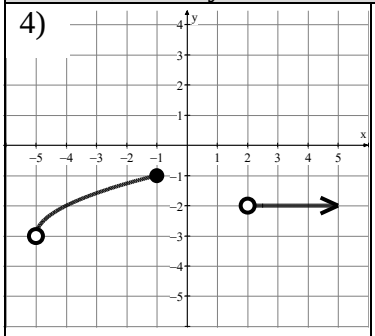
b. $x^2 - 9x - 112 = 0$

c. $2x^2 - 17x = -35$

Unit 2: Functions and Limits

For 4-5, identify the domain and range of each function. Use both interval notation and inequality notation.

4)



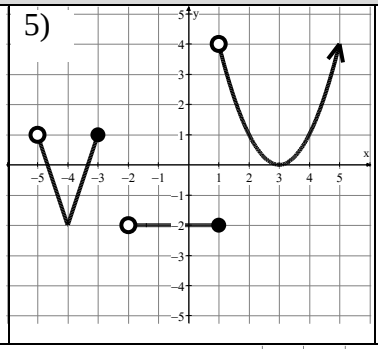
Domain:
Interval: _____

Inequality: _____

Range:
Interval: _____

Inequality: _____

5)



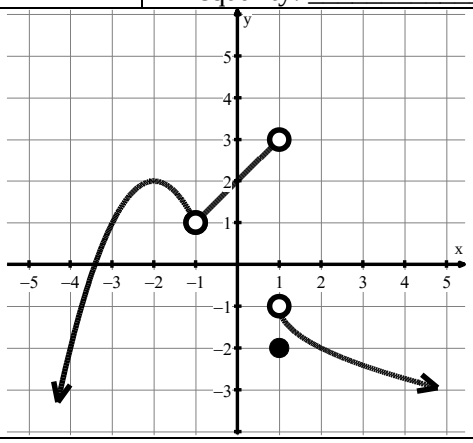
Domain:
Interval: _____

Inequality: _____

Range:
Interval: _____

Inequality: _____

6) Using the graph on the right, give the value of each statement.



a. $\lim_{x\to 1^-} f(x) =$

b. $f(-1) =$

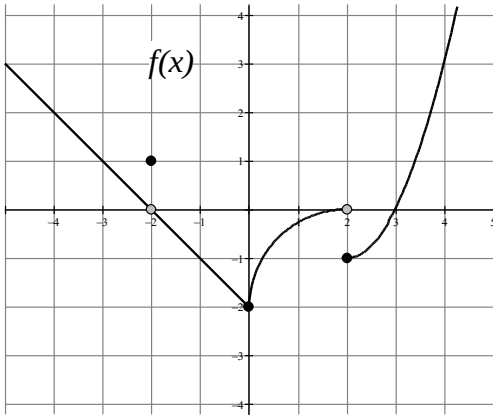
c. $\lim_{x\to -1} f(x) =$

d. $\lim_{x\to -2} f(x) =$

e. $f(1) =$

f. $\lim_{x\to 1^+} f(x) =$

For questions 7-14, refer to the graph of *f*(*x*)



7. State the intervals where *f*(*x*) is continuous.

8. State the values of *x* where the function is discontinuous and label them as removable or non-removable discontinuities.

9. $\lim_{x\to 0} f(x) =$

10. $\lim_{x\to 2^+} f(x) =$

11. $\lim_{x\to 2^-} f(x) =$

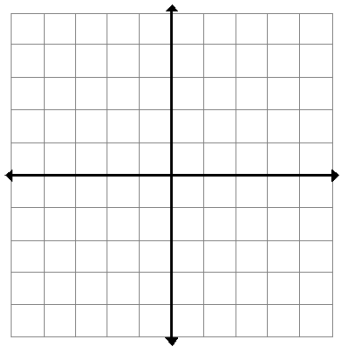
12. $\lim_{x\to 2} f(x) =$

13. $f(0) =$

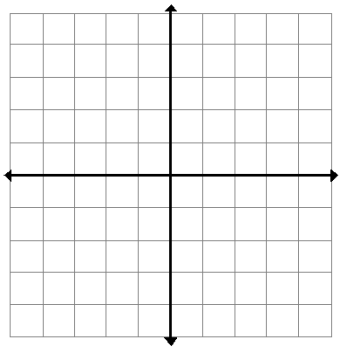
14. $\lim_{x\to -2} f(x) =$

For 15-16, graph the function and determine if it has points of discontinuity. If there is a discontinuity, tell what type of discontinuity it is and its *x*-value. Clearly mark all asymptotes with a dotted line.

15. $f(x) = \frac{2}{x}$



16. $f(x) = \frac{x}{x^2 - 4}$



Unit 3: Function Analysis

For 17-19, find the domain of the given function. Use interval notation.

17. $f(x)=\sqrt{10-x}$

18. $f(x)=\dfrac{x}{x-5}$

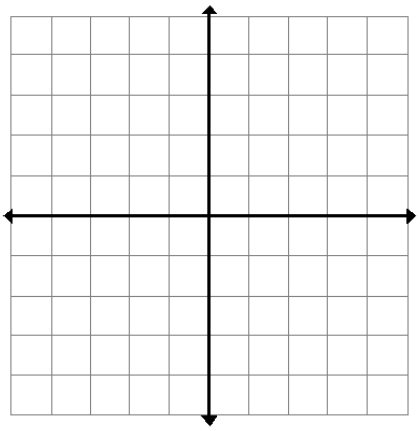
19. $f(x)=\dfrac{\sqrt{x-2}}{(x+7)(x-8)}$

For 20-21, find the range of the function. Use interval notation.

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

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

22. Sketch the piecewise function $f(x)=\begin{cases} x^3-1 & x\le 0 \\ \sqrt{x}+1 & x>0 \end{cases}$



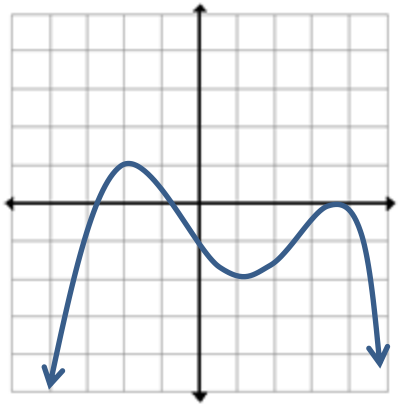
a. $f(2)=$

b. $f(-2)=$

c. $f(0)=$

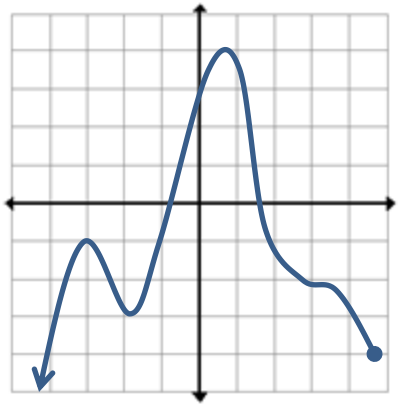
23. Label all local and absolute maximums and minimums.

a.



b.

c.



Unit 4: Function Algebra

24. $f(x)=3x+11$ and $g(x)=5x-1$

$f\cdot g=$

$\frac{f}{g}=$

25. $f(x)=4x^2+2x+3;\ \ g(x)=2x-4$

$f\circ g=$

For 26, confirm that f and g are inverses by showing the $f(g(x))= x$

26. $f(x) = 2x + 9$ and $g(x) = \dfrac{x-9}{2}$

For 27-32, if $f(x) = 2x - 5$ and the $g(x) = x^2 + 2x - 3$, find the following…

27. $f(2)$	28. $g(-2)$	29. $f(g(0))$
30. $f - g$	31. $f(x + h)$	32. $(f + g)(2)$

33. Is $f(x) = \frac{x+1}{x^2-1}$ even, odd, or neither. Justify your answer!

Transformations

34. $y = 2(x-5)^3 - 4$

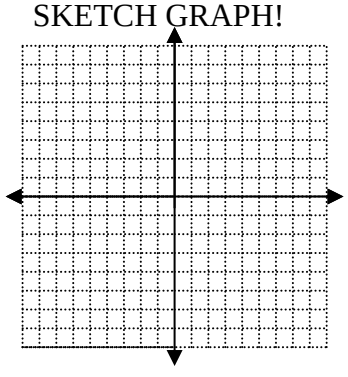
Name function:_____

Translation:

Scale:

Reflection:

SKETCH GRAPH!



35. $f(x) = -|3x + 6| + 5$

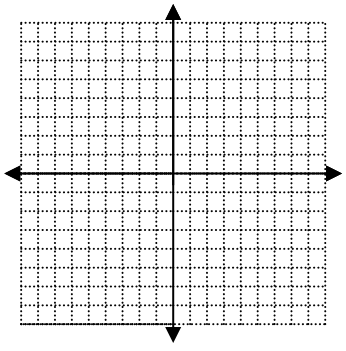
Name function:_____

Translation:

Scale:

Reflection:

SKETCH GRAPH!



36. $y = \sqrt{-x} + 3$

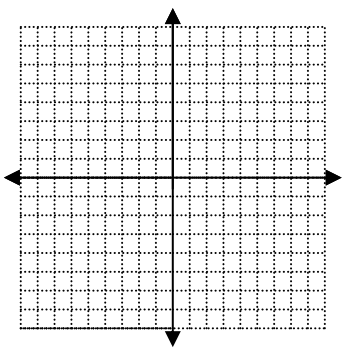
Name function:_____

Translation:

Scale:

Reflection:

SKETCH GRAPH!



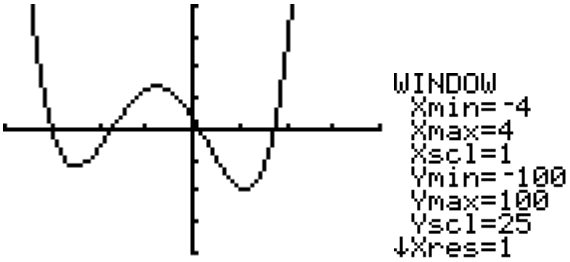
Unit 5: Polynomials

Graph on your calculator to solve the following.

37. $0 = x^4 + 2x^2 - 3x - 1$

38. $3x^6 - 2x^5 = 8 - 3x^2$

39. Use the graph of the function to determine at least one zero, then find the exact values of all the zeros using the Factor Theorem. $f(x) = 7x^4 + 20x^3 - 24x^2 - 60x + 9$



40. Factor the following.

a. $6x^2 + 13xy - 5y^2$

b. $5x^3 - 30x^2 - 8x + 48$

c. $216 + x^3$

41. Factor to solve the following.

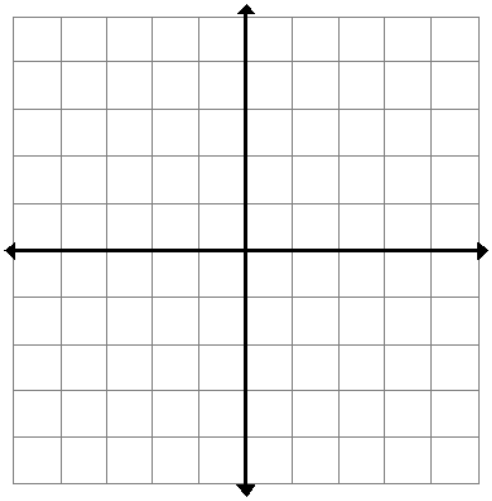
a. $4x^4 + 64x = 0$

b. $x^3 - 6x^2 + 8x = 0$

c. $x^4 - 11x^2 = -30$

Unit 6: Rational Functions

42. $f(x)=\dfrac{4}{x^3-9x}$



Vertical Asymptotes/Holes:

x-intercepts: *y*-intercepts:

Horizontal/Slant Asymptotes:

Solve:

43. $\frac{2x}{x+2}=\frac{5}{x^2-x-6}-\frac{1}{x-3}$

44. $\frac{7n^2-n}{n+9}=2n-1$

Simplify:

45. $\dfrac{\frac{3g}{g-5}+2}{\frac{3}{g-5}-4}$

46. $\frac{x+4}{\sqrt{x}-\sqrt{x+2}}$

Unit 7: Exponential and Logarithmic Functions

Evaluate.

47. $\log_2 64$

48. $\log_6 \frac{1}{36}$

Solve for the indicated variable. Round to three digits where applicable.

49. $(5^{2x})^{(x+7)} = 1$

50. $56 \log_7 x = 203$

51 . $e^{2x} - 22 = 25$

52. ln x = ln (x + 14) – ln (x + 90)

53 . $5 \log_9(x - 12) = 45$

Find the inverse of the given function.

54. $f(x) = 8^{x-3}$

55. ln y = 12 ln (x - 3)

56. At what rate compounded continuously will $12,000 have to be invested to amount to $35,000 in 12 years? Use $A = Pe^{rt}$.

APPLICATIONS

The formula for the path of a flying bullet is given: $h = -9.8t^2 + vt + s$ where h = height of object, in meters t = time, in seconds, v = velocity, in meters per second and s = starting height, in meters

Bob shoots a gun straight up with a velocity of 300 meters per second and a starting height of 2 meters.

57. What is the equation that represents this situation? $y =$ _____

58. What do the axes represent? *x-axis*: _____

y-axis: _____

59. What does the *y*-intercept represent to Bob? _____

60. What do the *x*-intercepts represent to Bob? _____

61. How high is the bullet after 4 seconds? _____

62. How long will it take for the bullet to hit the ground after it is fired? _____

63. What is the maximum height of the bullet? _____

64. At what time(s) will the bullet be 1200 meters in the air? _____

65. The concentration C (in milligrams) of a certain drug in a patient's bloodstream t minutes after injection is given by $C(t) = \dfrac{50t}{(t^2 + 25)}$. Using your graphing calculator, graph *C(t)* to answer the following questions.

a. What happens to the concentration of the drug as t increases?

b. Determine the time at which the concentration is highest.

c. What is the highest concentration?

d. What is the horizontal asymptote of *C(t)*? What does it mean in this situation?

e. If the drug is to be re-administered when the concentration decreases to 2 milligrams, how many minutes after the initial dose is the drug re-administered?