Unit 1: Algebra Review

1. Evaluate the expression for the given value of the variable: $3x^2 - 2(x-6)$ for $x = -2$

      A) 28   B) 4   C) -4   D) -28   E) none of these

2. Which one of the following relations is **not** a function?

a)

Domain:	1	3	8	0	2	3	5
Range:	-3	4	8	1	0	2	-10

b) $\{(2, 3), (4, 6), (5, 6), (10, 9)\}$

c) $\{(4, 0), (0, 4)\}$

d)

Domain:	1	2	3	4	5
Range:	0	2	0	2	0

3. Solve.

   a. Solve the equation: $5x - 3(x+1) = 9$

   A) x = 4   B) x = 3   C) x = 6   D) x = - 4   E) none of these

   b. Solve the inequality: $14x - 3(x+8) \le 9$

   A) $x \le -3$ B) $x \le 0$ C) $x \le 3$ D) $x \ge 3$ E) none of these

   c. Solve the absolute value inequality: $5|2x - 3| < 35$ (Free Response)   _____

4. Use the function below to find $4 \cdot f(-1)$

     $f(x) = -2x + 7$

   A)36   B) 9   C) 20   D) 5   E) none of these

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5. Solve using substitution or elimination. (Free Response)   _____

$$\begin{cases} -3x+2y=17 \\ x-5y=-10 \end{cases}$$

6. Simplify completely. Rationalize denominators if necessary.

a. $5\sqrt{98}$ 　　　　b. $\sqrt{\dfrac{5}{28}}$ 　　　　c. $\dfrac{9}{\sqrt{12}}$ 　　d. $\dfrac{30-15\sqrt{3}}{6}$ 　　　e. $\dfrac{2\sqrt{5}}{\sqrt{6}}$

_____ _____ _____ _____ _____

Unit 2: Quadratics

7. Write a quadratic equation in intercept/factored form with the following zeros. Then find the vertex of the equation.

       a. $4 \ and \ -2$

          A. $y=(x+4)(x-2);(1,-9)$ 　　　　　　B. $y=(x+4)(x+2);(-9,1)$

          C. $y=(x-4)(x+2);\ (1,-9)$ 　　　　　D. $y=(x-4)(x+2);(-9,1)$

       b. $6 \ and -4$

          A. $y=(x+6)(x-4);(1,25)$ 　　　　　　B. $y=(x-6)(x+4);\ \ (1,-25)$

          C. $y=(x+1)(x-24);(1,25)$ 　　　　　D. $y=(x-6)(x+4);(-25,1)$

8. A rectangle has a width of w feet and a length of $(-4w+50)$. (Free Response)

        a.   Write an equation in standard form for the area of the rectangle. _____

        b.   What width would maximize the area of the rectangle? What is the maximum area?

        Width_____ 　　　　Area_____

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9. Find the equation of the parabola in vertex form having the following vertex and y-intercept.

      a. $(2, -4)$ and a y-intercept of 4.

        A. $y = 2x^2 - 8x + 4$ B. $y = 2(x - 2)^2 - 4$
        C. $y = 2(x + 2)^2 - 4$ D. $y = (x - 2)^2 - 4$

      b. $(2,8)$ and a y-intercept of -4.

        A. $y = -3(x - 2)^2 + 8$ B. $y = -3(x + 8)^2 - 2$
        C. $y = -3x^2 + 12x - 6$ D. $y = (-3x^2 + 64)$

10. Factor the following quadratic expressions completely.
      a. $4x^3 - 36x$

        A. $4(x^3 - 9x)$ B. $4x(x^2 - 9)$ C. $4x(x + 3)(x - 3)$ D. $x(4x^2 - 9)$

      b. $3x^2 - 12$

        A. $3(x^2 - 4)$ B. $(3x + 2)(3x - 2)$ C. $3(x + 2)(x - 2)$ D. $(3x + 4)(x - 3)$

      c. $6x^2 + x - 35$

        A. $(6x + 1)(x - 7)$ B. $(2x + 5)(3x - 7)$ C. $(x + 15)(x - 14)$ D. None of these

      d. $2x^2 + 11x + 15$

        A. $(2x - 5)(x - 3)$ B. $(x + 3)(2x + 5)$ C. $(x + 5)(x + 6)$ D. None of these

11. Rewrite the following equations in standard form.
      a. $5(x - 2)^2 + 4$

        A. $y = 25x^2 - 100x + 104$ B. $y = 25x^2 - 20x + 8$
        C. $y = 25x^2 + 8$ D. $y = 5x^2 - 20x + 24$

      b. $y = 2(x + 4)^2 + 6$

        A. $y = 4x^2 + 32x + 70$ B. $y = 2x^2 + 38$
        C. $y = 2x^2 + 16x + 38$ D. $y = 2x^2 + 40x + 200$

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12. Solve the following quadratic equations. (Free Response)

     a. $x^2 + 5x + 6 = 0$ b. $4x^2 - 100 = 0$

     c. $2x^2 - 5x + 7 = 19$ d. $3x^2 - 294 = 0$

     e. $4x^2 - 26x - 14 = 0$

13. Solve each by completing the square. (Free Response)

     a. $x^2 - 16x + 72 = 0$ b. $4x^2 + 24x - 36 = 0$

     c. $2x^2 + 16x - 104 = 0$ d. $x^2 + 28x - 81 = 0$

14. Rewrite the equation in vertex form by completing the square. (Free Response)

     a. $y = x^2 + 8x - 6$ b. $y = 2x^2 + 20x + 15$

     c. $y = 3x^2 - 12x + 27$ d. $y = x^2 - 9x + 4$

15. Find the discriminant of each quadratic equation and give the number and type (real or complex) of solutions of each equation. (Free Response)

     a. $5x^2 - 6x + 10 = 0$ b. $3x^2 + 5x - 6 = 0$

     c. $2x^2 - 7x + 12 = 0$ d. $2x^2 - 8x + 8 = 0$

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16. Factor completely: $2x^2 + 11x + 15$ (Free Response)

Unit 3: Polynomials

17. What is the remainder when $f(x) = x^3 - 3x^2 + x - 5$ is divided by (x-2)?

      a) 1   b) -3   c) -7   d) -11   e) 0   f) none of the above

18. The function $f(x) = x^3 + 6x^2 + 11x + 6$ has a zero at x = -1. Find the other two zeroes of the function.

      a) x = -3, x = -2   b) x = -2, x = -1   c) x = -1, x = 2   d) x = 1, x = 3

      e) x = 3, x = -3   f) none of the above

19. Using the graph of *f(x) = (x-1)²+2*, determine which of the following is TRUE.

      a) The graph of f(x) has a relative MAXIMUM **at** x = 1
      b) The graph of f(x) has a relative MINIMUM **at** x = 2
      c) The function f(x) is increasing on the interval of x>1 or $(1, \infty)$
      d) The function f(x) is increasing on the interval of x<-1 or $(-\infty, -1)$
      e) None of the above are true.

20. Which of the following is a factor of $f(x) = x^3 - 10x^2 + 32x - 32$?

      a) x   b) x − 2   c) x + 2   d) x − 3   e) x + 4   f) none of the above

21. Write the polynomial function with zeros $3, 0, 5,$ and -2 in standard form. (Free Response)

22. Which function has the graph below?
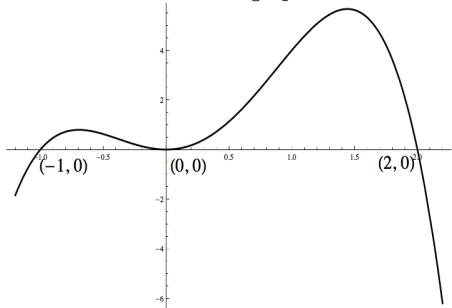
      a) $f(x) = 3x^2(x+1)(x-2)$

      b) $g(x) = -x^2(x-1)(x+2)$

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      c) $h(x) = x(x+1)^2(x-2)^2$

      d) $r(x) = -x(x-1)^2(x-2)$

      e) $s(x) = -2x^2(x+1)(x-2)$

No Calculator Practice (There will be 2-3 questions on the free response section that you will do without a calculator. They will be graphing questions like the ones below!)

Unit 2: Quadratics

23. Graph using transformations. Clearly plot 5 "key" points. State the transformations in addition to the vertex, min/max and y-intercept. If there is not the transformation, write "NA" or "none".

a. $y = 3(x + 5)^2 - 7$
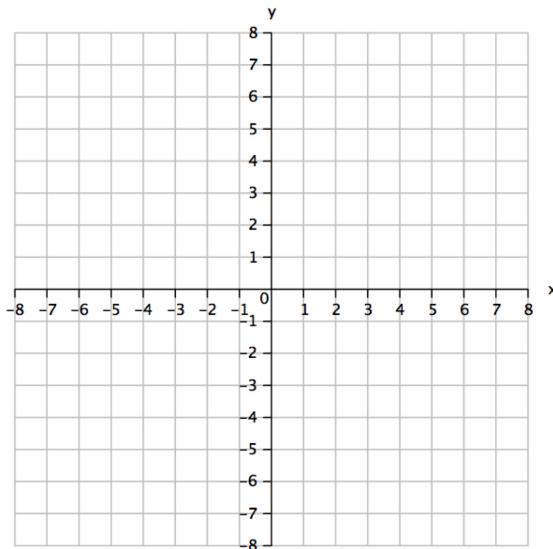
b. $y = -\dfrac{1}{2}(x+2)^2 + 7$
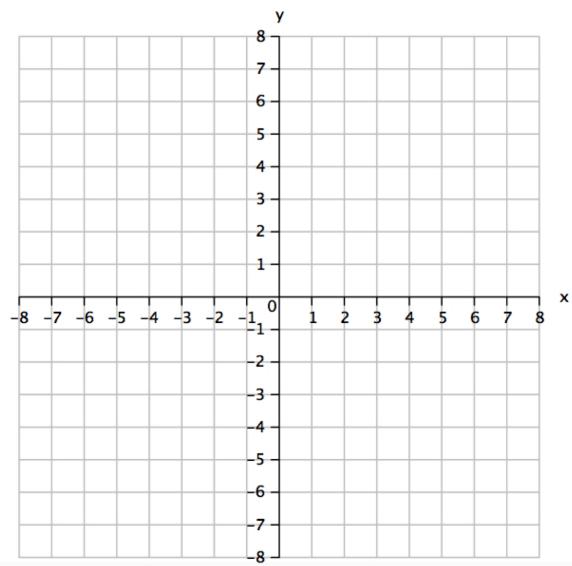
Transformations:

Reflection _____

Vertical Stretch _____

Left/Right _____

Up/Down _____

Vertex _____

Transformations:

Reflection _____

Vertical Stretch _____

Left/Right _____

Up/Down _____

Vertex _____

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NO CALCULATOR SECTION

24. Graph. State if the parabola has a min or max, the vertex, <u>equation</u> of the axis of symmetry, y-intercept, and x-intercepts, domain and range. Clearly plot 5 points.

a) $y = 2x^2 - 4x + 3$

Min/Max of _____ at _____
(circle one)

Vertex: _____

Axis of Symmetry: _____

y-intercept: _____

x-intercepts: _____
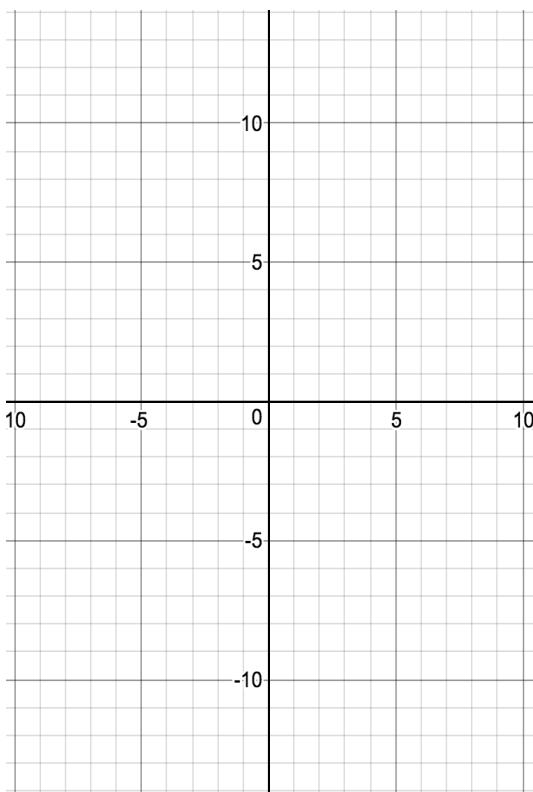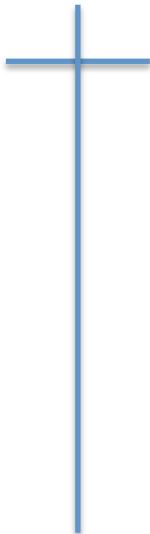
domain: _____

range: _____

b) $y = -x^2 - 8x - 7$

Min/Max of _____ at _____
(circle one)

Vertex: _____

Axis of Symmetry: _____

y-intercept: _____

x-intercepts: _____

domain: _____

range: _____

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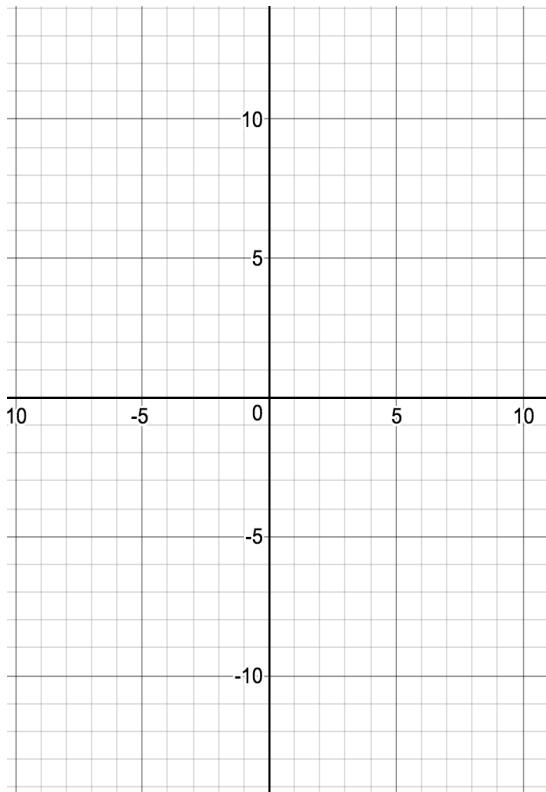
Unit 3: Polynomials (NC)
24. Fill in the missing information. Use interval notation as appropriate.

A. For the given graph of: $y = -2x^4 - 2x^3 + 5x^2 + 5x + 4$

Relative Minimum(s): _____

Relative Maximum(s):_____

Interval(s) of increase:_____

Interval(s) of decrease: _____

Intercepts: _____

Domain: _____   Range: _____

$f(x) \rightarrow$ _____ as $x \rightarrow \infty$

$f(x) \rightarrow$ _____ as $x \rightarrow -\infty$
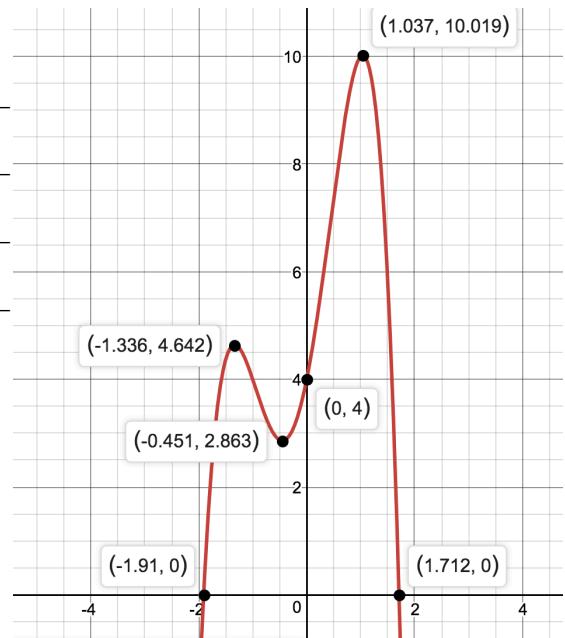
B. Use the graph to the right.

Relative Minimum(s): _____

Relative Maximum(s):_____

Interval(s) of increase:_____

Interval(s) of decrease: _____

Intercepts: _____

Domain: _____   Range: _____

$f(x) \rightarrow$ _____ as $x \rightarrow \infty$

$f(x) \rightarrow$ _____ as $x \rightarrow -\infty$

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