Precalculus: Quadratic Functions Assignment Name: _____

Answer the following on graph paper. Calculator Inactive (you may check with TI-89)

1. Write the equation of a parabola in each specified form. State the parameters (non- $x$ and $y$ variables) involved in each form (a), (b) and (c), and explain under what circumstances each form may be used.
   a) Transformational form b) Function form c) Factored form

2. Rearrange each quadratic into the other 2 forms:

   a) $y = -\frac{2}{9}x^2 - \frac{4}{3}x + 1$ b) $y - \frac{11}{5} = -2\left(x + \frac{3}{20}\right)^2$

3. What is true about the roots of a quadratic equation (number of $x$ – intercepts) if the quadratic discriminant is
   a) zero?
   b) negative?
   c) positive and a perfect square?
   d) positive but NOT a perfect square?

4. What is the basic parent quadratic function? Explain in words how you would graph this parabola.

5. <u>EXPLAIN</u> (show algebraic justification) whether or not the roots can be solved for by factoring; then <u>SOLVE</u> for the roots (by factoring if possible, otherwise by quadratic formula).

   a) $6x^2 + x - 12 = 0$ b) $-\frac{1}{2}x^2 = 4 - 3x$ c) $6x^2 + 2x - 9 = 0$

6. For the following parabolas
   - put the equation in transformational form
   - state the vertex and all intercepts as ordered pairs
   - state the equation of the axis of symmetry
   - state the domain and range
   - sketch accurately, using TWO DIFFERENT POINTS from the points above

   a) $y = -2x^2 - 4x$ b) $y = \frac{1}{2}x^2 - 4x + 9$ c) $y = \frac{2}{3}x^2 + \frac{14}{3}x + \frac{49}{6}$

7. State the value of
   a) $a$ if $f\left(3\right)=-1$ and $f\left(x\right)=ax^2-4x+2$.
   b) $h$ if the $x$ – intercepts are $\frac{3+i\sqrt{2}}{4}$ and $\frac{3-i\sqrt{2}}{4}$.
   c) $r_2$ if $r_1=1-\sqrt{3}$ and $h=4$.
   d) $b$ if the parabola is concave down with the same width as the parabola $y-2=\frac{1}{2}\left(x+1\right)^2$, has a $y$ – intercept of 3 and has an $x$ intercept of 1.

8. Write the equation of a parabola
   a) whose $x$ – intercepts are 2 and $-\frac{7}{3}$, and whose $y$ – intercept is 4.
   b) whose sum of roots is $-\frac{13}{4}$ and product of roots is $-\frac{\sqrt{2}}{2}$.
   c) whose discriminant is zero, axis of symmetry equation is $x=4$ and that passes through the point $\left(-1,7\right)$.
   d) that passes through the 3 points: $\left(1,-1\right)$, $\left(2,12\right)$ and $\left(-3,47\right)$.

9. Determine the nature of roots of the following:
   a) $y=4x^2+3x+1$
   b) $y=3x^2+4x-1$
   c) $y=3x^2+4x+1$
   d) $y=3x^2+4x+\frac{4}{3}$

10. Solve the following, where $x$ is a member of the complex number system, $x\in C$:
   a) $4x^2+3x+1=0$
   b) $3x^2+4x-1=0$
   c) $3x^2+4x+1=0$
   e) $3x^2+4x+\frac{4}{3}=0$
   f) $\left(x-3\right)\left(x+4\right)=8$
   g) $2-3\left(x+5\right)^2=29$

11. Determine the coordinates of all intercepts of the following:
   a) $y=\left(x+4\right)\left(x-3\right)$
   b) $y=-\frac{4}{3}\left(x+1\right)\left(2x-3\right)$
   c) $y=-2x^2+5x-1$
   d) $y-27=-3\left(x-3\right)^2$
   e) $y=4x^2-x$
   f) $y=x^2+x+1$

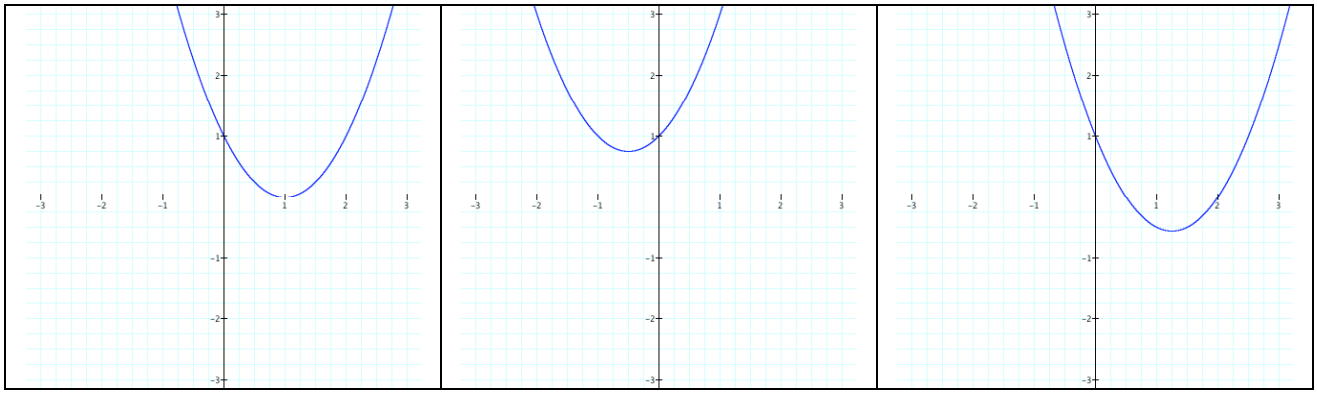
12. If one root of a quadratic equation that has real coefficients is $a+bi$ (where $a$ and $b$ are real numbers), then
    a) what is the other root?
    b) what is the expanded form of the quadratic equation?

13. Write a quadratic equation in the form $ax^2+bx+c=0$ with the given solutions:

    a) $-\frac{5}{4}, 6$ b) $0, 3$ c) $\frac{3+\sqrt{5}}{2}, \frac{3-\sqrt{5}}{2}$ d) $2-5i, 2+5i$

14. Match the graph with its equation, and explain how you were able to do so:

    (a) $y=x^2+x+1$ (b) $y=x^2-\frac{5}{2}x+1$ (c) $y=x^2-2x+1$



15. Graph following systems and determine their points of intersection. If a system doesn't have any intersection points, justify this conclusion algebraically (not just from the graph).

    a) $\begin{cases} y=x^2-2 \\ y=x+1 \end{cases}$ b) $\begin{cases} y=-2x^2+4 \\ \frac{x}{3}+\frac{y}{5}=1 \end{cases}$ c) $\begin{cases} x^2+3x-y+2=0 \\ 5x-y+1=0 \end{cases}$