

SHOW ALL WORK.

1. Solve by factoring:
  - a)  $x^2 - 2x - 15 = 0$
  - b)  $2x^2 + x - 3 = 0$
2. Solve by completing the square:
  - a)  $x^2 + 10x = 14$
  - b)  $2x^2 + 3x - 2 = 0$
3. Solve by using the quadratic formula:
  - a)  $2x^2 + 2x + 1 = 0$
  - b)  $6x = -3 - 2x^2$
4. Solve by any means:
  - a.  $3(x - 6)^2 = 27$
  - b.  $1 - 5x^{-1} - 6x^{-2} = 0$
  - c.  $x(x + 1) = 12$
5. What must be true of the discriminant if a quadratic equation has two distinct real roots?
6. What must be true of the discriminant if a quadratic equation has only one distinct real root?
7. What must be true of the discriminant if a quadratic equation has two complex roots?
8. Solve:  $x - 3\sqrt{x} - 10 = 0$
9. Solve:  $x^4 - x^2 - 12 = 0$
10. Solve:  $(x - 2)^2 - 4(x - 2) - 60 = 0$
11. Let  $y = -x^2 - 8x - 15$ 
  - a) Find the vertex (ordered pair)
  - b) What is the axis of symmetry (give the equation)
  - c) Find both  $x$  and  $y$  intercepts (if any)
  - d) Graph  $y = -x^2 - 8x - 15$
  - e) Write  $y = -x^2 - 8x - 15$  in standard form  $y = a(x - h)^2 + k$
12. Let  $f(x) = 3(x - 2)^2 - 4$ 
  - a. Find the vertex (ordered pair)
  - b. What is the axis of symmetry (give the equation)
  - c. Find both  $x$  and  $y$  intercepts (if any)
  - d. Graph  $f(x) = 3(x - 2)^2 - 4$
13. Solve the inequalities, write answer in interval notation.
  - a)  $2x^2 + 3x - 20 \leq 0$
  - b)  $(x + 4)(x - 2)(x - 4) > 0$
  - c)  $\frac{5 - x}{x - 1} \geq 0$

14. Let  $f(x) = -4x + 3$  and  $g(x) = -3x^2 + 2x - 1$  find all of the following. Simplify as much as possible.

a)  $(f + g)(x)$

b)  $(g - f)(-1)$

c)  $\left(\frac{f}{g}\right)(2)$

d)  $(f \cdot g)(x)$