1. [5 pts. each] Determine algebraically whether the graph is symmetric with respect to the $x$-axis, the $y$-axis, and the origin.

   (a) $5y = 7x^2 - 2x$

   (b) $3x = |y|$

2. [10 pts. each] Write an equation for a function that has a graph with the given characteristics.

   (a) The shape of $y = \sqrt{x}$, but shifted right 7 units and down 4 units.

   (b) The shape of $y = x^2$, but reflected across the $x$-axis and shifted left 3 units and up 2 units.

3. [10 pts. each] Simplify, writing the answer in the form $a + bi$ for real numbers $a$ and $b$. Here $i = \sqrt{-1}$.

   (a) $\sqrt{-4} \cdot \sqrt{-36}$

   (b) $-3i(2 - 8i)$

   (c) $(5 - 4i)(1 + 2i)$

   (d) $\dfrac{i}{2 + i}$

4. [10 pts.] Solve by factoring: $3t^3 + 2t = 5t^2$.

5. [10 pts.] Solve by completing the square: $x^2 + 6x = -2$.

6. [10 pts.] Solve by using the quadratic formula: $x^2 + 1 = x$.

7. [10 pts.] Find all solutions to $y^4 - 15y^2 - 16 = 0$.

8. [10 pts.] By setting up an algebraic equation, find the dimensions of a rectangular Persian rug whose perimeter is 28 ft and whose area is 48 ft$^2$.

9. [5 pts. each] Let $f(x) = -3x^2 + 24x - 49$.

   (a) Find the vertex of the function

   (b) Determine whether there is a maximum or minimum value, and find that value.

   (c) Find the range.

   (d) Find the intervals on which the function is increasing, and the intervals on which it's decreasing.

10. [15 pts.]  A cannabis farmer needs to separate and enclose two adjacent rectangular fields, one for indica and one for sativa. If a lake forms one side of the fields and 240 m of fencing is available, what is the largest total area that can be enclosed?

11. [10 pts. each]  Solve each equation algebraically.

    (a) $\dfrac{18}{x^2 - 3x + 9} - \dfrac{x}{x + 3} = \dfrac{81}{x^3 + 27}$

    (b) $\sqrt{a + 3} - 2 = 1$

    (c) $\sqrt{2y - 5} - \sqrt{y - 3} = 1$

    (d) $|5x - 3| - 3 = 9$

12. [10 pts.]  Solve for $P$:

$$I = \sqrt{\frac{A}{P}} - 1.$$

13. [10 pts. each]  Solve and write the solution set in interval notation.

    (a) $|2x - 4| \geq 8$

    (b) $|x + 6| < 4$

    (c) $|3x + 1| > x - 2$