1. [5 pts. each] List the quadrants satisfying each condition.

   (a) $y/x^2 < 0$

   (b) $x^3 > 0$ and $y^5 < 0$

2. [10 pts.] Graph $y = -\frac{1}{2}|x|$, letting $x = -4,\ -2,\ 0,\ 2,\ 4$.

3. [10 pts. each] Find the solution set of each equation.

   (a) $\dfrac{3}{x+3} = \dfrac{5}{2x+6} + \dfrac{1}{x-2}$

   (b) $4x + 7 = 7(x+1) - 3x$

4. [10 pts.] Mortimer Lumberbottom invested \$15,000, part of it in a stock that realized a 15% gain. However, the rest of the money invested suffered a 7% loss. If Mortimer had an overall gain of \$1590, how much was invested at each rate?

5. [10 pts.] Solve $A = \frac{1}{2}h(a+b)$ for b.

6. [10 pts. each] Express each in the standard form $a + bi$.

   (a) $(5 - 2i)^2$

   (b) $\dfrac{2 + 4i}{2 - i}$

7. [5 pts.] Do a long division that quickly determines whether i^{513} equals $1,\ -1,\ i,$ or $-i$.

8. [10 pts. each] Solve each by the method indicated.

   (a) $4x^2 - 13x = -3$ by factoring

   (b) $2x^2 - 4x - 1 = 0$ by completing the square

   (c) $x^2 - 2x + 17 = 0$ by the quadratic formula

9. [15 pts.] A machine produces topless boxes using square sheets of metal. The machine cuts equal-sized squares measuring three centimeters on a side from the corners of the sheet, and then folds up the resultant flaps to form the four sides of an open box. If each box must have a volume of 80 cm^3, find the dimensions of the box.

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

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

(b) $2x^{2/3} + 7x^{1/3} - 15 = 0$ (a substitution may help)

(c) $|x+1| + 6 = 2$

11. [10 pts. each] Solve each inequality, stating the solution set in interval notation.

(a) $7 - \frac{4}{5}x \le \frac{3}{5}$

(b) $|2(x-1) + 4| < 8$

(c) $-3|x+7| \ge -27$