SCORE: _____ / 20 POINTS

Find all solutions of the equation $\sqrt{2x+7} - x = 2$. **Check all solutions which are integers.**   **SCORE: _____ / 4 PTS**

$$\sqrt{2x+7} = x+2$$

CHECK: $\sqrt{2(-3)+7} - (-3) = \sqrt{1} + 3 = 4 \neq 2$

$$2x+7 = (x+2)^2$$

$\sqrt{2(1)+7} - 1 = \sqrt{9} - 1 = 2$

$$2x+7 = x^2 + 4x + 4$$
$$0 = x^2 + 2x - 3$$
$$0 = (x+3)(x-1)$$
$$x = -3 \text{ or } \boxed{x = 1}$$

Use absolute value notation to define the interval(s) of all real numbers no more than six units from -7.   **SCORE: _____ / 2 PTS**

$$|x-(-7)| \leq 6 \qquad \boxed{|x+7| \leq 6}$$

The heights h of two-thirds of the members of a certain population satisfy the inequality $\left|\dfrac{h-69}{2}\right| \leq 1.5$, where   **SCORE: _____ / 4 PTS**

h is measured in inches. Find the interval in which these heights lie. **Write your final answer in interval notation**.

$$-1.5 \leq \frac{h-69}{2} \leq 1.5$$
$$-3 \leq h-69 \leq 3$$
$$66 \leq h \leq 72$$
$$\boxed{[66, 72]}$$

Test $y = 2x^3$ for symmetry with respect to both axes and the origin. **State all conclusions clearly.**   SCORE: _____ / 3 PTS
(You may use the "shortcuts" discussed in lecture.)

$$y = 2(-x)^3 \qquad\qquad -y = 2x^3 \qquad\qquad -y = 2(-x)^3$$
$$y = -2x^3 \qquad\qquad y = -2x^3 \qquad\qquad -y = -2x^3$$
$$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad y = 2x^3$$

| not symmetric | not symmetric | symmetric |
| over y − axis | over x − axis | over origin |

ALTERNATE METHOD: show the graph is symmetric over the origin, but not symmetric over one axis,
then say it is also not symmetric over the other axis since it can't be symmetric in exactly 2 ways

---

Consider the graph of $y = 3x^2 - x - 3$.   SCORE: _____ / 3 PTS

[a]   Find the x − intercepts of the graph.

$$0 = 3x^2 - x - 3$$
$$x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(3)(-3)}}{2(3)} = \frac{1 \pm \sqrt{37}}{6} \qquad\qquad \left(\frac{1 \pm \sqrt{37}}{6}, 0\right)$$

[b]   Find the y − intercepts of the graph.

$$y = 3(0)^2 - 0 - 3 = -3 \qquad\qquad\qquad (0, -3)$$

Find all solutions of the equation $\dfrac{4}{x+1} - \dfrac{3}{x+2} = 1$. **Check all solutions which are integers.**   SCORE: _____ / 4 PTS

$$(x+1)(x+2)\left(\frac{4}{x+1} - \frac{3}{x+2}\right) = 1(x+1)(x+2) \qquad\qquad \text{CHECK:} \qquad \frac{4}{-3+1} - \frac{3}{-3+2} = -2 - (-3) = 1$$

$$4(x+2) - 3(x+1) = x^2 + 3x + 2 \qquad\qquad\qquad\qquad\qquad\qquad \frac{4}{1+1} - \frac{3}{1+2} = 2 - 1 = 1$$

$$4x + 8 - 3x - 3 = x^2 + 3x + 2$$
$$x + 5 = x^2 + 3x + 2$$
$$0 = x^2 + 2x - 3$$
$$0 = (x+3)(x-1)$$
$$x = -3 \text{ or } x = 1$$