1. (6 points each)

   (a) ANSWER: \( \left( 3, \frac{17}{3}, \frac{14}{3} \right) \)

   (b) ANSWER: \( 5x + 8y + z = 21 \)

2. (a) (4 points) ANSWER: \( x = \pi^2 + 2\pi t, \ y = -\pi^2 t, \ z = -\pi^2 - 2\pi t \)

   (b) (6 points) ANSWER: \( \frac{1}{3} \left[ 9^{3/2} - 8^{3/2} \right] \)

3. (4 points each)

   (a) HINT: Note that the angle between \( \overrightarrow{PQ} \) and \( \overrightarrow{QR} \) is 60°.

   ANSWER: \( \frac{99}{2} \)

   (b) ANSWER: \( \frac{99\sqrt{3}}{4} \)

   (c) ANSWER: The second, fourth, and fifth statements are true.

4. ANSWER: top left (b); top right (c); bottom left (a); bottom right (d)

5. (a) (2 points) ANSWER: \( \left( 2, -\frac{4\pi}{3} \right) \)

   (b) (2 points) ANSWER: \( \left( -5\sqrt{2}, \frac{\pi}{4} \right) \)

   (c) (2 points) ANSWER: \( \left( -\frac{3\sqrt{3}}{2}, -\frac{3}{2} \right) \)

   (d) (4 points) ANSWER: \( (x - \frac{7}{2})^2 + y^2 = \frac{49}{4} \), this is the circle with center \( \left( \frac{7}{2}, 0 \right) \) and radius \( \frac{7}{2} \)