## Quiz #4

1.   In this problem you will study the conic section defined by the polar equation:

$$r = \frac{4}{2 + \cos(\theta)}.$$

In each case, clearly indicate your final answer (e.g. by circling it).

(a)   **(1 point)** Find the eccentricity of the conic section.

(b)   **(1 point)** Classify the curve (ellipse, parabola or hyperbola).

(c)   **(1 point)** Find the equation of the directrix.

(d)   **(2 points)** Use the axes given below to draw a graph of the conic section in the **xy-plane.**
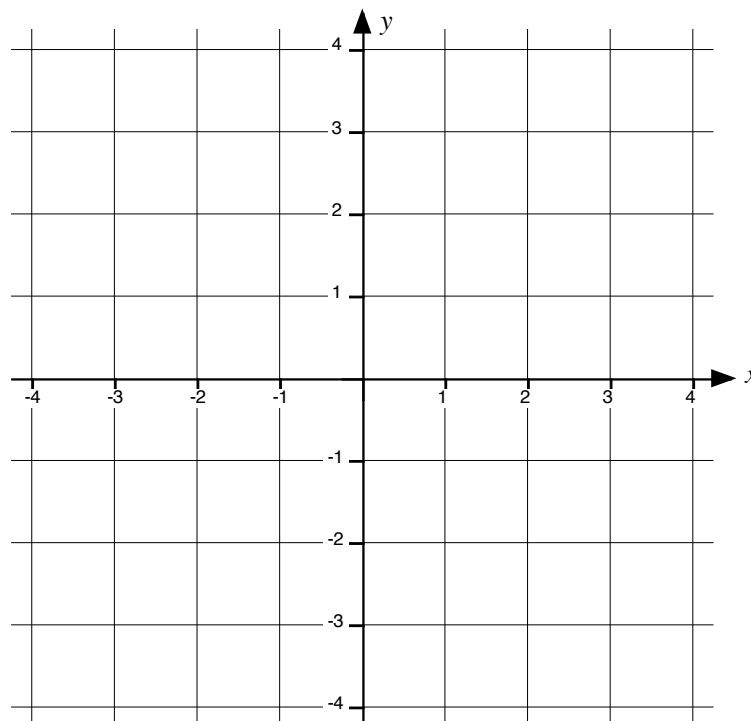
2. **(2 points)** Find a unit vector with the same direction as the vector:

$$-2\vec{i} - \vec{j} + 5\vec{k}.$$

Clearly indicate your final answer.

3. **(3 points)** While attempting the perilous maneuver of walking across a rope, a cat slipped and almost plummeted to its death. Fortunately the cat managed to grab the rope before it fell. Work out the tension (i.e. the vector $\vec{T_1}$, not just the magnitude of the vector) in the rope that is to the left of the cat. You can assume that the cat has a mass of 1 kg and that the acceleration due to gravity is 9.8 ms^{-2}.

Show all of your work and clearly indicate your final answer. The diagram shown below may be helpful, although it is **not drawn to scale**.