Math 1149, Quiz #11, Fall 2013 Name KEY

Instructions: Show all work. Answer each question as completely as possible. Use exact answers unless specifically asked to round.

1. Decompose the vector $\vec{w} = 10\hat{\imath} + 16\hat{\jmath}$ into two vectors, one parallel to $\vec{v} = \hat{\imath} - 2\hat{\jmath}$, and one perpendicular to it.

$\vec{w}_1 = \frac{\vec{v}\cdot\vec{w}}{\|\vec{v}\|^2}\vec{v} = \frac{10-32}{5}(\hat{\imath}-2\hat{\jmath}) = -\frac{22}{5}(\hat{\imath}-2\hat{\jmath}) = -\frac{22}{5}\hat{\imath} + \frac{44}{5}\hat{\jmath}$

$\vec{w}_2 = 10\hat{\imath} + 16\hat{\jmath} - \left(-\frac{22}{5}\hat{\imath} + \frac{44}{5}\hat{\jmath}\right) = \left(\frac{50}{5}+\frac{22}{5}\right)\hat{\imath} + \left(\frac{80}{5}-\frac{44}{5}\right)\hat{\jmath} =$

$\frac{72}{5}\hat{\imath} + \frac{36}{5}\hat{\jmath}$

2. Define the term "generator" in the context of a conic.

the generator is the line rotated around an axis that forms a cone.

3. How do you have to cut a cone to obtain a parabola?

with a plane at an angle parallel to a generator

4. Find the standard equation of a circle whose general form is $x^2 + y^2 + 4x + 2y + 1 = 0$. State the center of the circle and the radius.

$(x^2+4x+4) + (y^2+2y+1) = -1+4+1 = 4$

$(x+2)^2 + (y+1)^2 = 4$

Center $(-2,-1)$

radius $= 2$