1. Polar Form of a vector gives its magnitude and direction. For the magnitude we will typically use the variable r. For the direction we will typically use the variable θ.

2. Polar Form will be <r, θ> and Rectangular Form will be <x, y>

3. The equations needed for conversion between the 2 forms are:
   $x = r\cos\theta$, $y = \sin\theta$, $r = \sqrt{x^2 + y^2}$, $\theta = \arctan\frac{y}{x}$

4. Convert the Polar Form <27, 49°> to Rectangular form:
   $x = r\cos\theta$ and $y = r\sin\theta$. Therefore we compute <27 cos 49°, 27 sin 49°> = $\boxed{<17.714, 20.377>}$

5. Convert Rectangular Form <57, -129> to Polar Form:
   $r = \sqrt{x^2 + y^2}$ and $\theta = \arctan\frac{y}{x}$. Therefore we compute $<\sqrt{57^2 + 129^2}, \arctan\frac{-129}{57}>$
   = $\boxed{<141.032, 293.839°>}$

6. A 7000 pound vehicle is on a 25° incline.
   Find the component vector acting on a perpendicular to the incline in Rectangular form.
   Find the component vector acting on a perpendicular to the incline in Polar Form.
   The force due to gravity is **f** = <0, -7000>
   Two unit vectors along the incline are $\vec{U}$ = <cos 10°, sin 10°> and $\vec{D}$ = <cos 190°, sin 190°>.
   The downward unit vector perpendicular to the incline is **p** = <cos 280°, sin 280°>.
   Calculate: $\text{proj}_{\mathbf{p}}\mathbf{f} = \frac{\mathbf{p}\cdot\mathbf{F}}{\|\mathbf{p}\|^2}\mathbf{p} = \frac{<\cos 280°, \sin 280°> \bullet <0, -7000>}{1}$ <cos 280°, sin 280°>.
   = -7000 sin 280° <cos 280°, sin 280°> = $\boxed{<1197.071, -6788.924>}$ Rectangular Form
   $r = \sqrt{1197.071^2 + 6788.924^2} = 6893.654$ and $\theta = 280°$ $\boxed{<6893.654, 280°>}$ Polar Form

Pre-Calculus 2 Assignment 207 Monday, February 9, 2015 Hour Name Ewell-Key

1. Find the angle between $\vec{u} = \langle 2, -3 \rangle$ and $\vec{v} = \langle 1, -2 \rangle$.

2. How much force is necessary to prevent a 5000-pound vehicle from rolling down a 10° incline.

3. An 850-pound motorcycle is parked on a 5° incline. Find the force component perpendicular to the incline.

4. Force $\vec{F} = \langle 29, 51 \rangle$ moves an object from (3, 9) to (7, 41). Find the work done.

5. Find the Projection of $\vec{u} = \langle 6, -2 \rangle$ onto $\vec{v} = \langle 22, -7 \rangle$.

6. Given in Polar Form, $\vec{v} = \langle 41, 22° \rangle$. Convert to Rectangular Form.

7. Given in Rectangular Form, $\vec{v} = \langle 71, 22 \rangle$. Convert to Polar Form.

8. Given $\vec{u} = \langle 29, 40^\circ \rangle$ and $\vec{v} = \langle 99, 91^\circ \rangle$. Find the dot producd $\vec{u} \bullet \vec{v}$.

9. Find the work done by Force $\vec{F}$ with magnitude 55 and direction 18°, acting on an object with displacement from (14, 22) to (20, 30).

10. In Polar Form, $\vec{u} = \langle 14, 60° \rangle$ and $\vec{v} = \langle 23, 17° \rangle$. Find $\vec{u} + \vec{v}$ in Polar Form.