Place your answers in the space provided. You must show your work to receive credit.

(10 pts) 1. Determine the trigonometric form for $4 + 8i$. Use radians for $\theta$ and round all answers to the nearest tenth.

$4 + 8i =$

(10 pts) 2. For the vectors $\vec{a} = \langle -2, 5 \rangle$ and $\vec{b} = \langle 2, 2 \rangle$, find the magnitude of $5\vec{a} - 2\vec{b}$.

Magnitude =

(10 pts) 3. Find an equation in $x$ and $y$ for the curve whose parametric equations are $x = -3t$, $y = 2t^2 + 1$ for any real number $t$.

Equation:
Place your answers in the space provided. You must show your work to receive credit.

(10 pts) 4. Find the angle, $\theta$, between the vectors $\langle -3, 4 \rangle$ and $\langle 1, 3 \rangle$. Round your answer to the nearest tenth of a degree.

\[ \theta = \]

(10 pts) 5. Find an equation for the parabola with axis parallel to the y-axis, vertex $(2, -3)$ and passing through the point $(-2, -2)$.

Equation:

(10 pts) 6. Find the center and vertices of the conic given by $9x^2 - 4y^2 - 54x - 16y + 29 = 0$.

Center:

Vertices:
(12 pts) 7. An airplane leaves Purdue International Airport at 10:00 a.m. and travels in the direction 75° at 175 mi/hr. At 10:30 a.m. a second airplane leaves the same airport and travels in the direction 185° at 135 mi/hr. At 12:00 noon, how far apart are the airplanes? Round your answer to the nearest mile. (Draw and label a sketch, set up an equation(s) and solve.)

Distance =

(12 pts) 8. An arch of a bridge is semi-elliptical with horizontal major axis. The base of the arch is 40 feet across. The height of the arch 8 feet from the center of the base is 14 feet. Find the height of the arch at the center of the bridge. Round your answer to the nearest tenth of a foot. (Draw and label a sketch, set up an equation(s) and solve.)

Height =
(16 pts) 9. Find all asymptote(s), intercept(s) and sketch the given function. If there is none for any part, write none in the space for the answer.

\[ f(x) = \frac{x - 3}{x^2 - 4x - 5} \]

Horizontal Asymptote(s):

Vertical Asymptote(s):

x-intercept(s):

y-intercept(s):