

Using complete sentences, write the distance based definition of "parabola".

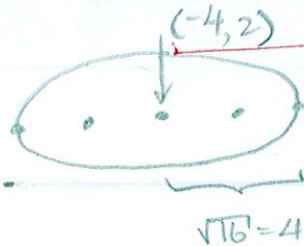
SCORE: ____ / 2 PTS

A PARABOLA IS THE LOCUS OF POINTS IN A PLANE
WHICH ARE EQUIDISTANT
FROM A FIXED LINE AND A FIXED POINT NOT ON THE LINE

GRADED BY ME

Find the foci and vertices of the ellipse $3x^2 + 4y^2 + 24x - 16y + 16 = 0$.

SCORE: ____ / 5 PTS

$$\begin{aligned}
 3x^2 + 24x + 4y^2 - 16y &= -16 \\
 3(x^2 + 8x) + 4(y^2 - 4y) &= -16 \\
 \textcircled{\frac{1}{2}} \quad 3(x^2 + 8x + 16) + 4(y^2 - 4y + 4) &= -16 + 3(16) + 4(4) \quad \textcircled{\frac{1}{2}} \\
 3(x+4)^2 + 4(y-2)^2 &= 48 \quad \textcircled{\frac{1}{2}} \\
 \frac{(x+4)^2}{16} + \frac{(y-2)^2}{12} &= 1 \quad \textcircled{\frac{1}{2}}
 \end{aligned}$$


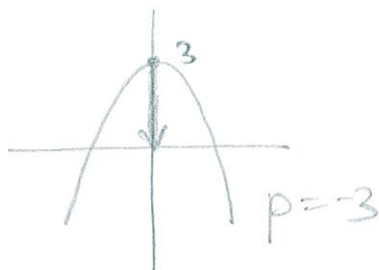
$c^2 = 16 - 12 = 4$
 $c = 2$

VERTICES: $(-4 \pm 4, 2)$
 $= (0, 2), (-8, 2) \quad \textcircled{1}$
 FOCI: $(-4 \pm 2, 2)$
 $= (-2, 2), (-6, 2) \quad \textcircled{1}$

The focus of a parabola is at the origin, and its vertex is at $(0, 3)$.

SCORE: ____ / 2 PTS

Find the equation of the parabola.



$$\begin{aligned}
 x^2 &= 4(-3)(y-3) \\
 x^2 &= -12(y-3) \\
 \textcircled{\frac{1}{2}} \quad \textcircled{1} \quad \textcircled{\frac{1}{2}}
 \end{aligned}$$

Fill in the blanks. **NO NEED TO SHOW WORK.**

SCORE: ____ / 3 PTS

[a] The latera recta of an ellipse are perpendicular to THE MAJOR AXIS and pass through THE FOCI.

[b] The eccentricity of the ellipse $\frac{x^2}{6} + \frac{y^2}{10} = 1$ is $\frac{\sqrt{10}}{5}$. $c^2 = 10 - 6 = 4 \rightarrow c = 2$
 $e = \frac{c}{a} = \frac{2}{\sqrt{10}}$

Find the equation of the ellipse with foci $(7, -5)$ and $(7, 1)$, and a major axis of length 10.

SCORE: ____ / 4 PTS

CENTER = $(7, \frac{-5+1}{2}) = (7, -2)$

$\frac{1}{2}(10) = 5$
 $\begin{array}{c} \bullet V \\ \bullet F(7, 1) \\ \bullet C(7, -2) \\ \bullet F(7, -5) \\ \bullet V \end{array}$
 $\uparrow 3$

$\frac{(x-7)^2}{16} + \frac{(y+2)^2}{25} = 1$
 $\frac{1}{2} \quad \frac{1}{2} \quad 1 \quad \frac{1}{2}$

$5^2 = 3^2 + b^2$
 $b^2 = 16$

Find the vertex, focus and equation of the directrix of the parabola $2x^2 - 24x + y + 73 = 0$.

SCORE: ____ / 4 PTS

$2x^2 - 24x = -y - 73$

$x^2 - 12x = -\frac{1}{2}y - \frac{73}{2}$

$x^2 - 12x + 36 = -\frac{1}{2}y - \frac{73}{2} + 36$

$(x-6)^2 = -\frac{1}{2}y - \frac{1}{2}$

$(x-6)^2 = -\frac{1}{2}(y+1) \rightarrow 4p = -\frac{1}{2} \rightarrow p = -\frac{1}{8}$

DIRECTRIX $y = -1 + \frac{1}{8} \rightarrow y = -\frac{7}{8}$

VERTEX $(6, -1)$

FOCUS $(6, -1 - \frac{1}{8}) = (6, -\frac{9}{8})$

MUST HAVE
 "y = "

