

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

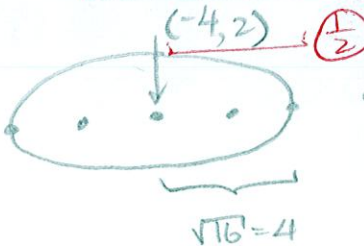
SCORE: ____ / 2 PTS

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

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


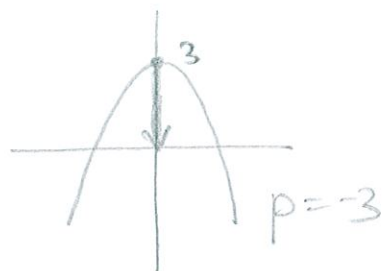
$c^2 = 16 - 12 = 4$
 $c = 2$

$$\begin{aligned} \text{VERTICES} &= (-4 \pm 4, 2) \\ &= (0, 2), (-8, 2) \quad \textcircled{1} \\ \text{FOCI} &= (-4 \pm 2, 2) \\ &= (-2, 2), (-6, 2) \quad \textcircled{1} \end{aligned}$$

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 $\frac{x^2}{8} + \frac{y^2}{17} = 1$ is $\frac{3\sqrt{17}}{17}$. $c^2 = 17 - 8 = 9 \rightarrow c = 3$
 $e = \frac{c}{a} = \frac{3}{\sqrt{17}}$

Find the equation of the ellipse with foci $(-7, 5)$ and $(-7, -3)$, and a minor axis of length 10.

SCORE: ____ / 4 PTS

CENTER = $(-7, \frac{5+(-3)}{2}) = (-7, 1)$

$\frac{1}{2}(10) = 5$

$F(-7, 5)$
 $C(-7, 1)$
 $F(-7, -3)$

$\frac{(x+7)^2}{25} + \frac{(y-1)^2}{41} = 1$

$a^2 = 5^2 + 4^2$
 $a^2 = 41$

Find the vertex, focus and equation of the directrix of the parabola $2x^2 - 16x + y + 33 = 0$.

SCORE: ____ / 4 PTS

$2x^2 - 16x = -y - 33$
 $x^2 - 8x = -\frac{1}{2}y - \frac{33}{2}$
 $x^2 - 8x + 16 = -\frac{1}{2}y - \frac{33}{2} + 16$
 $(x-4)^2 = -\frac{1}{2}y - \frac{1}{2}$
 $(x-4)^2 = -\frac{1}{2}(y+1) \rightarrow 4p = -\frac{1}{2} \rightarrow p = -\frac{1}{8}$

DIRECTRIX $y = -1 + \frac{1}{8} \rightarrow y = -\frac{7}{8}$
 VERTEX $(4, -1)$
 FOCUS $(4, -1 - \frac{1}{8}) = (4, -\frac{9}{8})$

MUST HAVE "y ="