

1. NO CALCULATORS ALLOWED
2. UNLESS STATED OTHERWISE, YOU MUST SIMPLIFY ALL ANSWERS
3. SHOW PROPER & CONCISE PRECALCULUS LEVEL WORK TO JUSTIFY YOUR ANSWERS

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

SCORE: 1 / 2 PTS

An ellipse is a locus of points on a 2D plane that are equidistant from two fixed points called foci.

THIS DESCRIBES A PERPENDICULAR BISECTOR

Find the foci and vertices of the ellipse $3x^2 + 4y^2 + 6x - 24y - 9 = 0$.

$$\begin{array}{r} 36 \\ + 12 \\ \hline 48 \end{array}$$

SCORE: 5 / 5 PTS

$$3x^2 + 6x + 4y^2 - 24y = 9 \rightarrow 3(x^2 + 2x) + 4(y^2 - 6y) = 9$$

$$\frac{1}{2} \left(3(x^2 + 2x + 1) + 4(y^2 - 6y + 9) \right) = \frac{1}{2} (9 + 3 + 36) = 48 \rightarrow \frac{3(x+1)^2}{48} + \frac{4(y-3)^2}{48} = \frac{48}{48}$$

$$\frac{(x+1)^2}{16} + \frac{(y-3)^2}{12} = 1$$

vertex length = 4

$$16 - 12 = 4$$

$$\sim c = 2$$

center: $(-1, 3)$

vertices: $(-5, 3); (3, 3)$

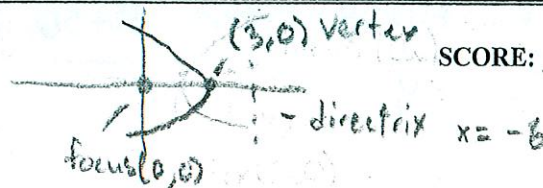
foci: $(1, 3); (-3, 3)$

$$\begin{array}{r} 16 \\ 3 \overline{) 48} \\ \underline{31} \\ 18 \\ \underline{18} \\ 0 \end{array}$$

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

$$y^2 = 4(3)(x - 3)$$

$$y^2 = 12(x - 3)$$



SCORE: ____ / 2 PTS

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

SCORE: 2 / 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 $\frac{x^2}{12} + \frac{y^2}{13} = 1$ is $\frac{5}{\sqrt{13}}$. $12+13=25 \quad c=5$

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

SCORE: / 4 PTS

center: $(-7, 1)$ $\frac{1}{2}$ major axis = 5 foci length distance = 8

$c = 48 \div 2 = 4$

$25 - 4 = 21$

$$\frac{(x+7)^2}{21} + \frac{(y-1)^2}{25} = 1$$

$\frac{1}{2}$
1
 $\frac{1}{2}$

Find the vertex, focus and equation of the directrix of the parabola $2x^2 - 20x + y + 51 = 0$.

SCORE: / 4 PTS

$2x^2 - 20x + y + 51 = 0$

$2x^2 - 20x + y = -51$

$2x^2 - 20x + y \leq -51$

$2(x^2 - 10x) + y = -51$

$-\frac{1}{2} \cdot \frac{1}{4} = -\frac{1}{8}$ $\frac{1}{2}$

$(-1 + (-\frac{1}{8}))$

$-\frac{9}{8} + \frac{1}{8} = -\frac{8}{8}$

$2(x^2 - 10x + 25) + y = -51 + 50$ $\frac{1}{2}$ $\frac{1}{2}$

$2(x-5)^2 = -y-1$ $\frac{1}{2}$

$2(x-5)^2 = -1(y+1)$

$(x-5)^2 = -\frac{1}{2}(y+1)$ $\frac{1}{2}$

directrix: $y = -\frac{7}{2}$ $\frac{1}{2}$

vertex: $(5, -1)$ $\frac{1}{2}$

foci: $(5, -\frac{9}{2})$ $\frac{1}{2}$

