

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

SCORE: ____ / 2 PTS

AN ELLIPSE IS THE LOCUS OF POINTS IN THE PLANE WHOSE DISTANCES TO TWO FIXED POINTS (CALLED THE FOCI) ADD UP TO A FIXED CONSTANT

GRADED BY ME

Find the center, foci, vertices and eccentricity of the ellipse $3x^2 + 2y^2 - 12x + 16y + 8 = 0$.

SCORE: ____ / 5 PTS

$$3x^2 - 12x + 2y^2 + 16y = -8$$

$$3(x^2 - 4x) + 2(y^2 + 8y) = -8$$

$$3(x^2 - 4x + 4) + 2(y^2 + 8y + 16) = -8 + 12 + 32$$

$$\textcircled{1} \underline{3(x-2)^2 + 2(y+4)^2 = 36} \textcircled{1}$$

$$\underline{\frac{(x-2)^2}{12} + \frac{(y+4)^2}{18} = 1} \textcircled{\frac{1}{2}}$$

$$\text{CENTER} = \underline{(2, -4)} \textcircled{\frac{1}{2}}$$

$$\text{VERTICES} = (2, -4 \pm \sqrt{18}) = \underline{(2, -4 \pm 3\sqrt{2})} \textcircled{\frac{1}{2}}$$

$$c^2 = 18 - 12 = 6$$

$$c = \underline{\sqrt{6}} \textcircled{\frac{1}{2}} \textcircled{\frac{1}{2}}$$

$$\text{FOCI} = \underline{(2, -4 \pm \sqrt{6})}$$

$$e = \frac{\sqrt{6}}{\sqrt{18}} = \frac{1}{\sqrt{3}} = \underline{\frac{\sqrt{3}}{3}} \textcircled{\frac{1}{2}}$$

Find the equation of the parabola with focus $(-11, 5)$ and directrix $x = 3$.

SCORE: ____ / 3 PTS



$$\text{VERTEX} = \left(\frac{-11+3}{2}, 5 \right) = \underline{(-4, 5)} \textcircled{\frac{1}{2}}$$

$$p = \underline{-7} \textcircled{\frac{1}{2}}$$

$$(y-5)^2 = 4(-7)(x+4)$$

$$\underline{(y-5)^2} = \underline{-28(x+4)} \textcircled{\frac{1}{2}} \textcircled{1} \textcircled{\frac{1}{2}}$$

Fill in the blanks.

SCORE: ____ / 2 PTS

- [a] The line passing through the focus and vertex of a parabola is called the AXIS OF SYMMETRY ①
- [b] The line segment joining the vertices of an ellipse is called the MAJOR AXIS ①

Find the vertex, focus and equation of the directrix of the parabola $x^2 + 10x + 2y + 7 = 0$.

SCORE: ____ / 4 PTS

$$x^2 + 10x = -2y - 7$$

$$x^2 + 10x + 25 = -2y + 18$$

$$\left(\frac{1}{2}\right) (x+5)^2 = -2(y-9) \quad ①$$

$$\text{vertex} = (-5, 9) \quad \left(\frac{1}{2}\right)$$

$$4p = -2 \rightarrow p = -\frac{1}{2} \quad \left(\frac{1}{2}\right) \quad \begin{array}{c} \text{---} \\ \downarrow \end{array}$$

$$\text{Focus} = (-5, 9 - \frac{1}{2}) = (-5, \frac{17}{2}) \quad \left(\frac{1}{2}\right)$$

$$\text{DIRECTRIX } y = 9 + \frac{1}{2}$$

$$\left(\frac{1}{2}\right) y = \frac{19}{2} \quad \left(\frac{1}{2}\right)$$

Find the equation of the ellipse with foci $(4, -7)$ and $(-2, -7)$, and a major axis of length 18.

SCORE: ____ / 4 PTS

$$\text{CENTER} = \left(\frac{4 + (-2)}{2}, -7\right) = (1, -7) \quad \left(\frac{1}{2}\right) \quad \begin{array}{ccccccc} & & 3 & & & & \\ & & \rightarrow & & & & \\ V & F & C & F & V & & \\ & & 9 & & & & \end{array}$$

$$a^2 = 3^2 + b^2$$

$$b^2 = 81 - 9 = 72 \quad \left(\frac{1}{2}\right)$$

$$\left(\frac{1}{2}\right) \frac{(x-1)^2}{81} + \frac{(y+7)^2}{72} = 1 \quad \left(\frac{1}{2}\right)$$

①
↑
①/2