Using complete sentences, write the distance based definition of "parabola". **SCORE: ____ / 2 PTS**

A PARABOLA IS THE LOCUS OF POINTS IN THE PLANE WHOSE DISTANCES TO A FIXED LINE AND A FIXED POINT NOT ON THE LINE ARE EQUAL GRADED BY ME

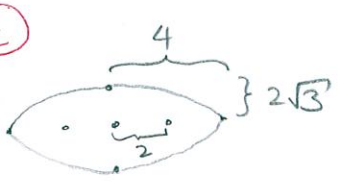
Find the foci and vertices of the ellipse $3x^2 + 4y^2 + 18x - 8y - 17 = 0$. **SCORE: ____ / 4 PTS**

$3(x^2+6x) + 4(y^2-2y) = 17$

$3(x^2+6x+9) + 4(y^2-2y+1) = 17+27+4$

$3(x+3)^2 + 4(y-1)^2 = 48$ (½) (½)

$\frac{(x+3)^2}{16} + \frac{(y-1)^2}{12} = 1$ (½)



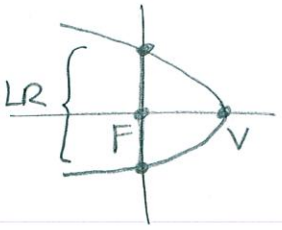
CENTER = $(-3, 1)$ (½)

VERTICES = $(-3 \pm \sqrt{16}, 1) = (-3 \pm 4, 1) =$ $(-7, 1)$ AND $(1, 1)$ (1)

$c^2 = 16 - 12 = 4 \rightarrow c = 2$ FOCI = $(-3 \pm 2, 1) =$ $(-5, 1)$ AND $(-1, 1)$ (1)

The focus of a parabola is at the origin, and its vertex is at $(5, 0)$. **SCORE: ____ / 4 PTS**

[a] Find the equation of the parabola.



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

$y^2 = -20(x-5)$ (½) (1) (½)

[b] The latus rectum of a parabola is the line segment passing through the focus, perpendicular to the axis of symmetry, with both endpoints on the parabola. Find the co-ordinates of the endpoints of the latus rectum of the parabola in [a].

$y^2 = -20(0-5)$

$y^2 = 100$ (1)

$y = \pm 10$ $(0, \pm 10)$ (1)

Fill in the blanks. **NO NEED TO SHOW WORK.** (1) **SCORE: ____ / 2 PTS**

[a] The midpoint of the minor axis of an ellipse is called the CENTER of the ellipse.

[b] The eccentricity of the ellipse $\frac{x^2}{8}+\frac{y^2}{17}=1$ is $\frac{3\sqrt{17}}{17}$. (1)

$c^2 = 17-8 = 9 \rightarrow c = 3$

$a = \sqrt{17}$

Find the equation of the ellipse with foci $(-7, 5)$ and $(-7, -3)$, and a minor axis of length 10. **SCORE: ____ / 4 PTS**

CENTER $= (-7, 1)$

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

$a^2 = 41$ ($\frac{1}{2}$)

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

(1) (1)

Find the vertex, focus and equation of the directrix of the parabola $2x^2 - 16x + y + 33 = 0$. **SCORE: ____ / 4 PTS**

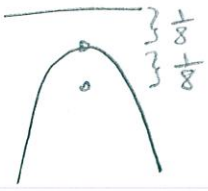
$2x^2 - 16x = -y - 33$

$x^2 - 8x = -\frac{1}{2}y - \frac{33}{2}$

$x^2 - 8x + 16 = -\frac{1}{2}y - \frac{33}{2} + 16$

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

($\frac{1}{2}$) ($\frac{1}{2}$)



VERTEX $(4, -1)$ ($\frac{1}{2}$)

$4p = -\frac{1}{2} \rightarrow p = -\frac{1}{8}$

FOCUS $(4, -1 - \frac{1}{8}) = (4, -\frac{9}{8})$ (1)

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

$y = -\frac{7}{8}$ (1) MUST INCLUDE "$y =$"