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

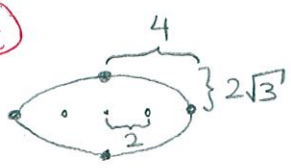
Find the foci and vertices of the ellipse $3x^2 + 4y^2 + 24x - 16y + 16 = 0$. **SCORE: ____ / 4 PTS**

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

$3(x^2+8x+16) + 4(y^2-4y+4) = -16 + 48 + 16$

$3(x+4)^2 + 4(y-2)^2 = 48$ (½)

$\frac{(x+4)^2}{16} + \frac{(y-2)^2}{12} = 1$ (½)



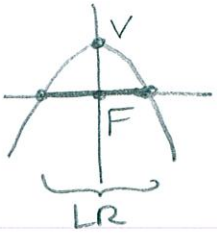
CENTER = $(-4, 2)$ (½)

VERTICES = $(-4 \pm \sqrt{16}, 2) = (-4 \pm 4, 2) =$ $(-8, 2)$ AND $(0, 2)$ (1)

$c^2 = 16 - 12 = 4 \rightarrow c = 2$ FOCI = $(-4 \pm 2, 2) =$ $(-6, 2)$ AND $(-2, 2)$ (1)

The focus of a parabola is at the origin, and its vertex is at $(0, 3)$. **SCORE: ____ / 4 PTS**

[a] Find the equation of the parabola.



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

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

$x^2 = -12(0-3)$

$x^2 = 36$ (1)

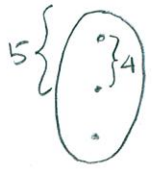
$x = \pm 6$ $(\pm 6, 0)$ (1)

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

[a] The midpoint of the minor axis of an ellipse is called the CENTER (1) of the ellipse.

[b] The eccentricity of the ellipse $\frac{x^2}{12}+\frac{y^2}{13}=1$ is $\frac{\sqrt{13}}{13}$ (1). $c^2=13-12=1 \longrightarrow c=1$, $a=\sqrt{13}$

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



CENTER $= (-7, 1)$

$5^2 = b^2 + 4^2$

$b^2 = 9$

$\frac{(x+7)^2}{9}$ (1/2) (1) $+$ $\frac{(y-1)^2}{25}$ (1/2) $= 1$ (1/2)

Find the vertex, focus and equation of the directrix of the parabola $2x^2 - 20x + y + 51 = 0$. **SCORE: ____ / 4 PTS**

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

$x^2 - 10x = -\frac{1}{2}y - \frac{51}{2}$

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

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

VERTEX $(5, -1)$ (1/2)

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

FOCUS $(5, -1-\frac{1}{8}) = (5, -\frac{9}{8})$ (1)

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

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