SCORE: ___ / 30 POINTS

TO GET FULL CREDIT:

YOU MUST SHOW THE WORK THAT LEAD TO YOUR ANSWER YOU MUST USE THE STANDARD FORM FOR THE EQUATIONS AS SHOWN IN LECTURE AND THE TEXTBOOK

Find the standard form of the equation of the parabola with focus (-5, 7) and directrix x = 1.

SCORE: ___ / 4 POINTS

vertex =
$$\left(\frac{-5+1}{2}, 7\right) = \underline{(-2, 7)}$$

p = directed distance from (-2, 7) to (-5, 7) = -3 vertical directrix

$$(y-7)^2 = 4(-3)(x-2)$$

 $(y-7)^2 = -12(x+2)$

$$\frac{(y-7)^2}{1} = \frac{-12(x+2)}{1}$$

Consider the ellipse with equation $3x^2+5y^2-12x+40y+77=0$.

SCORE: ___ / 6 POINTS

[a] Find the standard form of the equation of the ellipse.

$$3x^{2}-12x + 5y^{2}+40y = -77$$

$$3(x^{2}-4x) + 5(y^{2}+8y) = -77$$

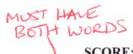
$$3(x^{2}-4x) + 5(y^{2}-4x) = -77$$

[b] Find the co-ordinates of both vertices.

$$(2\pm\sqrt{5},-4)$$

TOGETHER

Fill in the blanks.



SCORE: ___/ 5 POINTS

- [a] The difference of the distances between any point on a hyperbola and the foci equals the length of the TRANSVERSE AXIS.
- [b] The VERTEX of a parabola is the midpoint between the FOCUS and the DIRECTRIX
- [c] The **CONJUGATE** axis of a hyperbola passes through the center, but does not contain any points on the hyperbola.
- [d] The eccentricity of an ellipse with a = 6 and c = 2 is $\frac{1}{3}$.

Using the distance-based definition of a hyperbola,

find the standard form of the equation of the hyperbola containing all points whose distances to the foci $(0, \pm 4)$ differs by 2.

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

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

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

$$y^{2} + 8y + 16 = 4 + 4\sqrt{x^{2} + (y-4)^{2}} + y^{2} - 8y + 16$$

$$16y - 4 = 4\sqrt{x^{2} + (y-4)^{2}}$$

$$16y^{2} - 8y + 1 = x^{2} + (y-4)^{2}$$

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

$$15y^{2} - x^{2} = 15$$

$$2y^{2} - \frac{x^{2}}{15} = 1$$

OR
$$\sqrt{x^2 + (y-4)^2} - \sqrt{x^2 + (y+4)^2} = 2$$

 $\sqrt{x^2 + (y-4)^2} = 2 + \sqrt{x^2 + (y+4)^2}$
 $\sqrt{x^2 + (y-4)^2} = 4 + 4\sqrt{x^2 + (y+4)^2} + x^2 + (y+4)^2$
 $y^2 - 8y + 16 = 4 + 4\sqrt{x^2 + (y+4)^2} + y^2 + 8y + 16$
 $\sqrt{x^2 + (y-4)^2} + \sqrt{x^2 + (y+4)^2}$
 $\sqrt{x^2 + (y+4)^2} + \sqrt{x^2 + (y+4)^2}$
 $\sqrt{x^2$

Consider the ellipse with foci (4, -10) and (4, 2) and a minor axis of length 10.

SCORE: ____ / 6 POINTS

[a] Find the ends of the minor axis.

center
$$=$$
 $\left(4, \frac{-10+2}{2}\right) = \underbrace{(4, -4)}_{1}$ along vertical major axis horizontal semi-minor axis $= \frac{10}{2} = 5$ ends of minor axis $= (4 \pm 5, -4) = \underbrace{(9, -4)}_{2}$ and $\underbrace{(-1, -4)}_{3}$

[b] Find the standard form of the equation of the ellipse.

focal length =
$$2^{-1}10 = 12$$

 $\frac{1}{2}$ focal length = $\frac{6}{2}$
 $a^2 = 5^2 + 6^2 = 61$
 $a = \sqrt{61}$ $\sqrt{(x-4)^2}$
 $\sqrt{(x-4)^2}$ + $\frac{(y+4)^2}{61}$ = 1