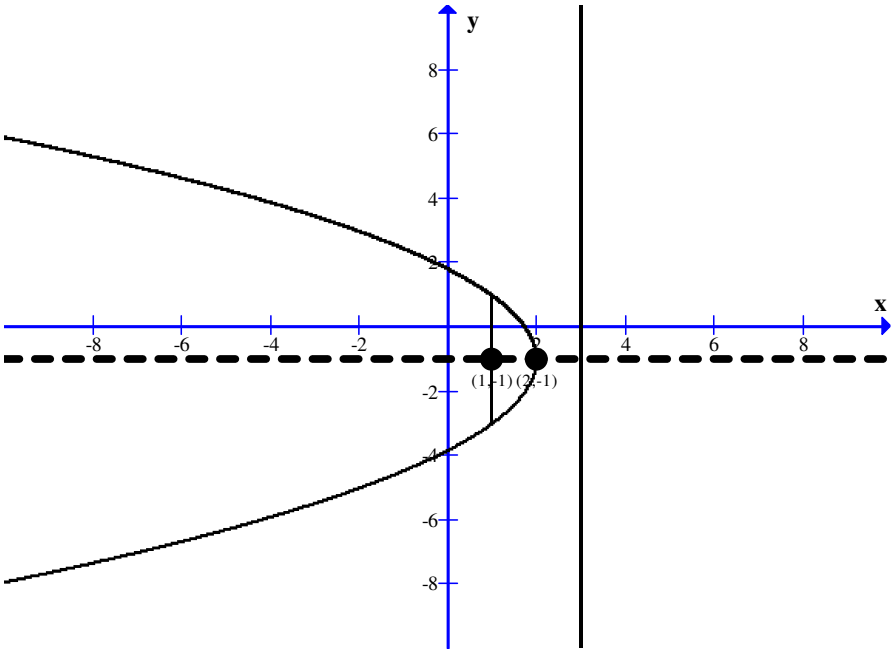
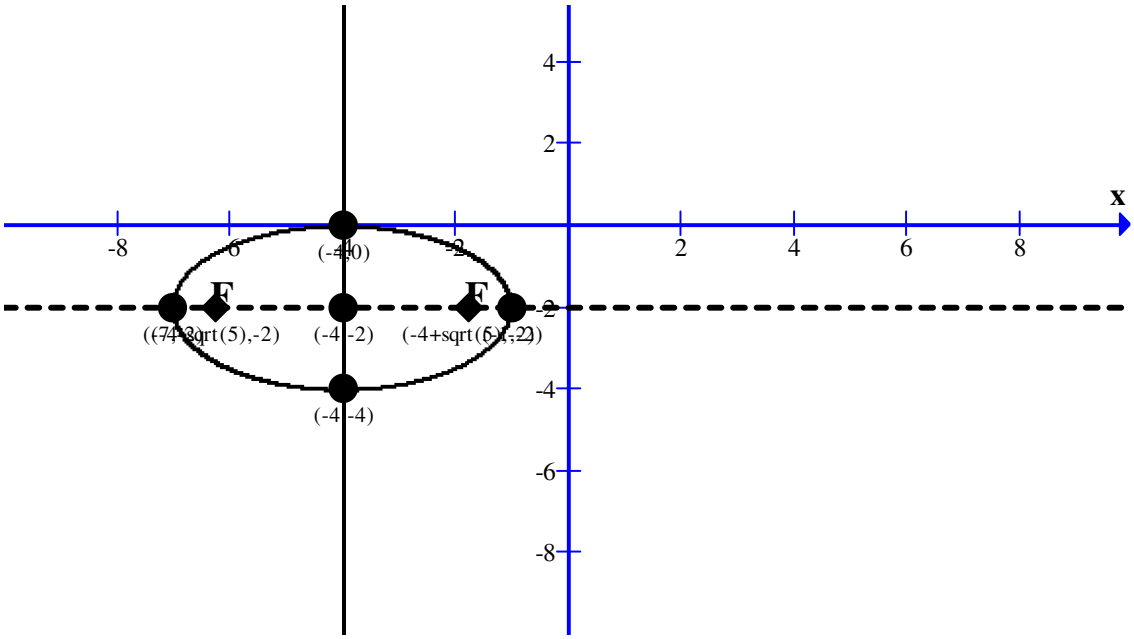
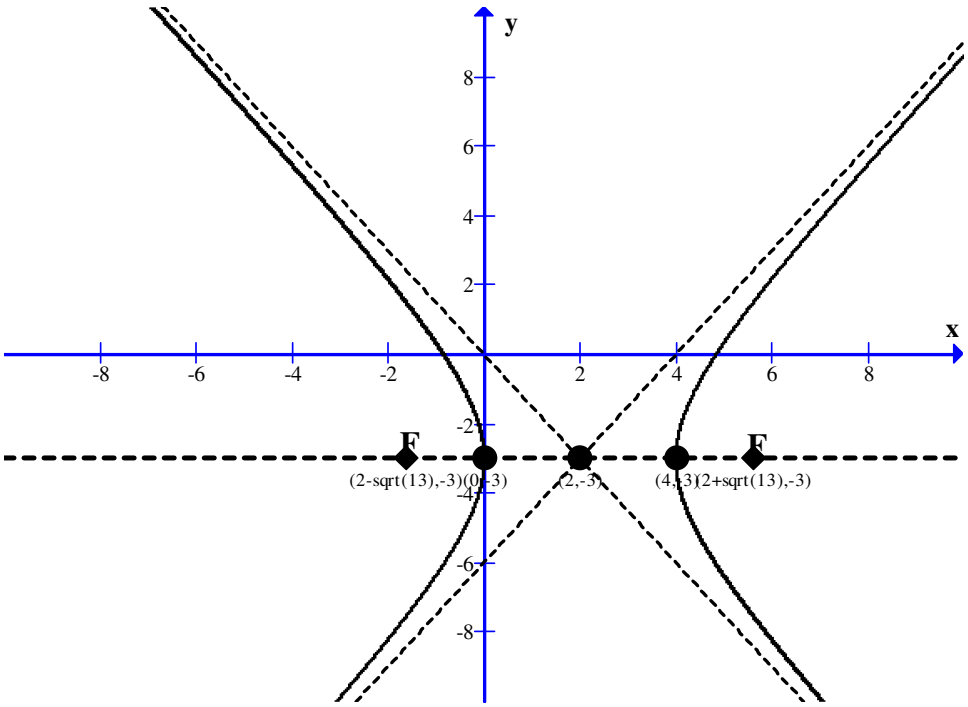
Mat 150 Practice Test 5 Key
#1. True, #2. True, #3. False, #4. True, #5. True
#6. Set-builder, Interval, Number-line #7. Parabola, Ellipse, Hyperbola
#8. A room with an elliptical shaped ceiling where you can hear people whispering if you are at a focus point. #9. Medicine, architecture, navigation, bridge design, etc…see book. #10. ∪ ∩
#11. A. (2, -1) B. 1 C. (1, -1) D. y = -1 E. x = 3 F. 4



#12. A. (-4, -2), B. (-4-sqrt(5), -2) & (-4+sqrt(5), -2), C. 6, D. 4, E. (-7, -2) & (-1, -2)



#13. G. (2, -3), H. (2-sqrt(13), -3) & (2+sqrt(13), -3), I. x = 2, J. y = -3 K. (0, -3) & (4, -3)



#14.

A.

$$4x^2+3y^2+8x-6y=5$$

$$4\left(x^2+2x\right)+3\left(y^2-2y\right)=5$$

$$4\left(x^2+2x+1-1\right)+3\left(y^2-2y+1-1\right)=5$$

$$4\left((x+1)^2-1\right)+3\left((y-1)^2-1\right)=5$$

$$4(x+1)^2-4+3(y-1)^2-3=5$$

$$4(x+1)^2+3(y-1)^2=12$$

$$\frac{4(x+1)^2}{12}+\frac{3(y-1)^2}{12}=\frac{12}{12}\Leftrightarrow\frac{(x+1)^2}{3}+\frac{(y-1)^2}{4}=1$$

$\therefore$ ***Ellipse***

B.

$$y^2-4x^2-4y-8x-4=0$$

$$y^2-4y-4x^2-8x-4=0$$

$$y^2-4y-4\left(x^2+2x\right)=4$$

$$\left(y^2-4y+4-4\right)-4\left(x^2+2x+1-1\right)=4$$

$$(y-2)^2-4-4\left((x+1)^2-1\right)=4$$

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

$$(y-2)^2-4(x+1)^2=4 \Leftrightarrow \frac{(y-2)^2}{4}-\frac{(x+1)^2}{1}=\frac{4}{4}=1 \therefore \textbf{\textit{Hyperbola}}$$

C.

$$x^2+6x-4y+1=0$$

$$x^2+6x=4y-1$$

$$x^2+6x+9-9=4y-1$$

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

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

$$(x+3)^2=4(y+2) \therefore \textbf{\textit{Parabola}}$$

#15.

$$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1 \rightarrow a=20, b=15$$

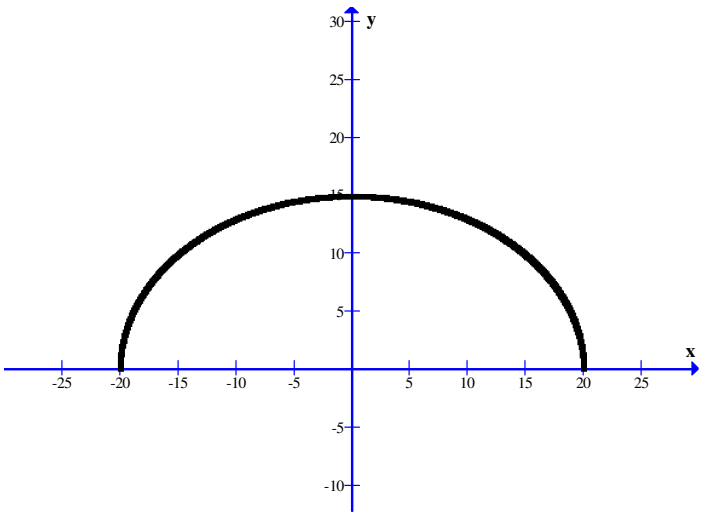
$$\frac{x^2}{20^2}+\frac{y^2}{15^2}=1 \Leftrightarrow \frac{x^2}{400}+\frac{y^2}{225}=1$$

when $x=10$**.**

$$\frac{10^2}{400}+\frac{y^2}{225}=1 \rightarrow \frac{100}{400}+\frac{y^2}{225}=1 \rightarrow \frac{y^2}{225}=1-\frac{1}{4}=\frac{3}{4}$$

$$\therefore y=\pm\sqrt{225\frac{3}{4}}=\frac{15}{2}\sqrt{3}\,ft$$ **/* ignore the negative for length**

The height of the arch 10 feet off center is $\frac{15}{2}\sqrt{3}\,ft$**.**



#16. A flashlight is a paraboloid of revolution. It has a diameter of 6 cm and a depth of 2 cm. How far from the vertex should the bulb be placed to emit a beam that is parallel to the axis of symmetry?

$x^2 = 4ay$

$3^2 = 4a2$

$\therefore a = \frac{9}{8}$

Place the bulb 9/8 cm away from the vertex.