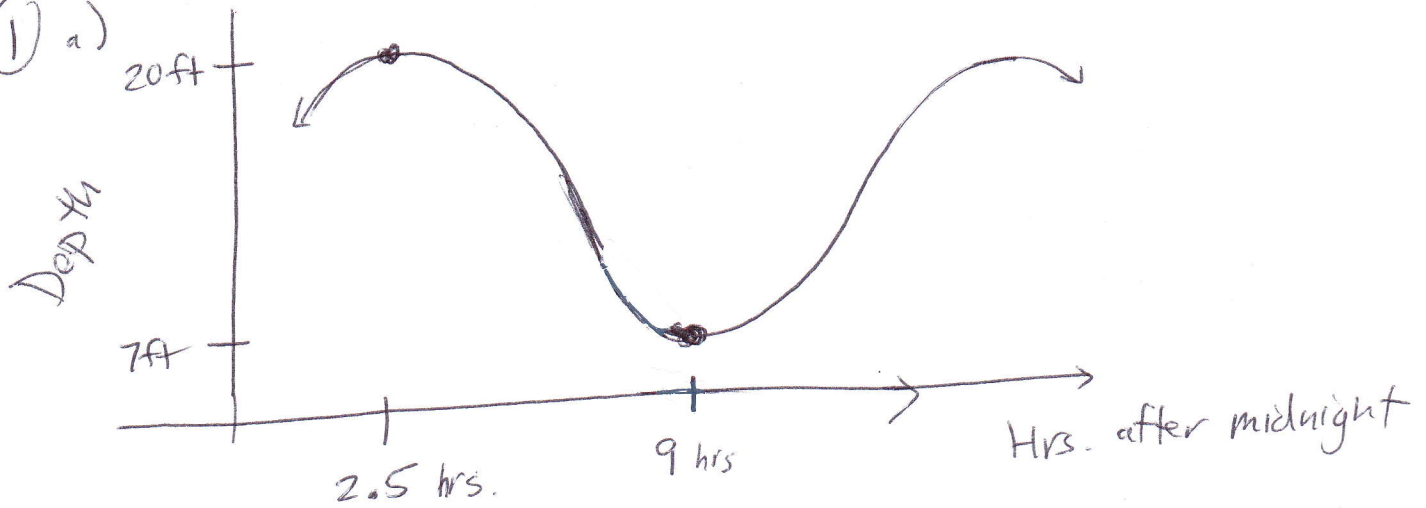


① a)



Max = 20  
Min = 7

$$\frac{1}{2}P = 6.5$$
$$P = 13$$

$$B = \frac{2\pi}{P} = \frac{2\pi}{13}$$

$$\text{Axis} = \frac{\text{Max} + \text{Min}}{2} = \frac{20 + 7}{2} = \frac{27}{2} = k$$

$$\text{Amplitude} = \frac{\text{Max} - \text{Min}}{2} = \frac{20 - 7}{2} = \frac{13}{2} = A$$

$$y = A \cos(B(x-h)) + k$$

starts at max for cos

b)

$$y = \frac{13}{2} \cos\left(\frac{2\pi}{13}(x - 2.5)\right) + \frac{27}{2}$$

c)

$$3:30 \text{ PM} = 3 + 12 + 0.5 = 15.5 \text{ hrs.}$$

$$\frac{13}{2} \cos\left(\frac{2\pi}{13}(15.5 - 2.5)\right) + \frac{27}{2} = \frac{13}{2} \cos(2\pi) + \frac{27}{2} = \frac{13 + 27}{2} = 20 \text{ft}$$

$$(2) a) 9x^2 - 4y^2 + 36x + 8y - 4 = 0$$

Hyperbola

$$9(x^2 + 4x + 4) - 4(y^2 - 2y + 1) = 4 + 36 - 4$$

$$\frac{9(x+2)^2}{36} - \frac{4(y-1)^2}{36} = \frac{36}{36}$$

Hor.  $\rightarrow \frac{(x+2)^2}{4} - \frac{(y-1)^2}{9} = 1$

$$a^2 = 4$$

$$a = \pm 2$$

$$b^2 = 9$$

$$b = \pm 3$$

$$C(-2, 1)$$

$$\text{Vertices } (0, 1) (-4, 1)$$

$$\text{Foci } c^2 = a^2 + b^2 = 4 + 9 = 13$$

$$(-2 \pm \sqrt{13}, 1)$$

$$\text{Asymptotes } m = \pm \frac{3}{2}$$

$$y = \frac{3}{2}x + b$$

$$y = -\frac{3}{2}x + b$$

$$1 = \frac{3}{2}(-2) + b$$

$$1 = -\frac{3}{2}(-2) + b$$

$$1 = -3 + b$$

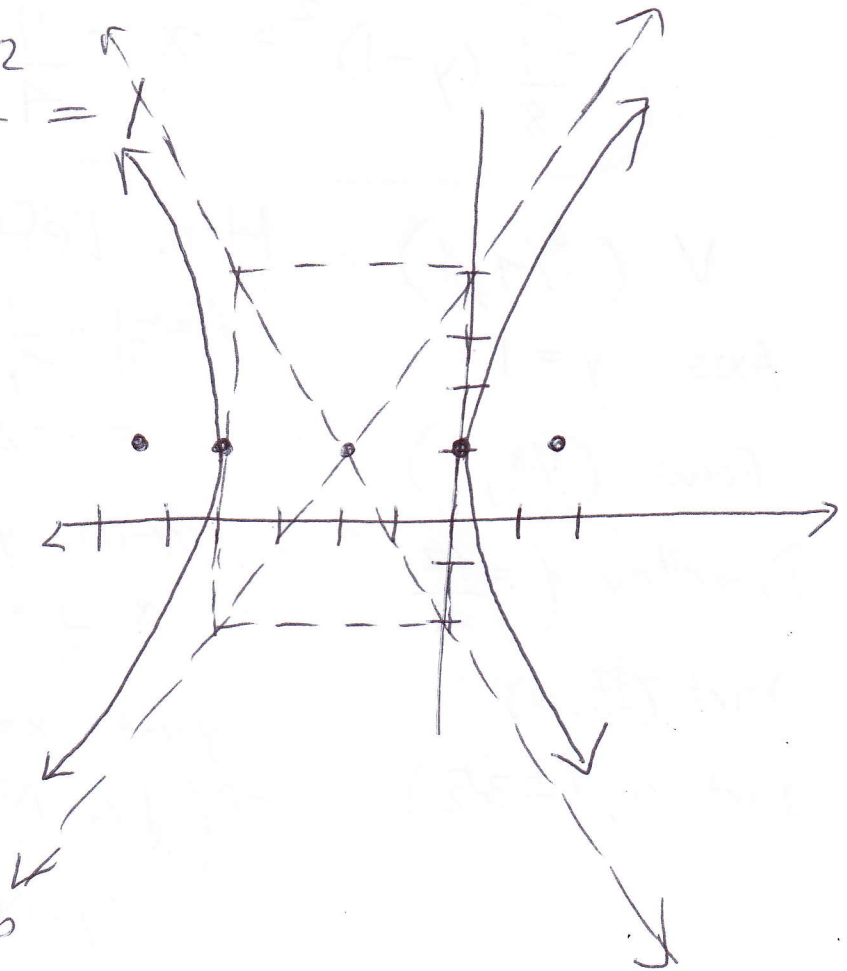
$$1 = 3 + b$$

$$4 = b$$

$$-2 = b$$

$$y = \frac{3}{2}x + 4$$

$$y = -\frac{3}{2}x - 2$$



2b)  $3y^2 + 24x - 6y - 51 = 0$

Parabola

$$3(y^2 - 2y + 1) = -24x + 51 + 3$$

$$\frac{3(y-1)^2}{-24} = \frac{-24x + 54}{-24}$$

$$\frac{-1}{8}(y-1)^2 = x - \frac{9}{4}$$

V  $(\frac{9}{4}, 1)$

Axis  $y = 1$

Focus  $(\frac{1}{4}, 1)$

Directrix  $x = \frac{17}{4}$

X-int  $(\frac{17}{8}, 0)$

Y-int  $(0, 1 \pm 3\sqrt{2})$

Hor. Left

$$A = -\frac{1}{8} = \frac{1}{4p}$$

$$p = -2$$

x-int  $y = 0$

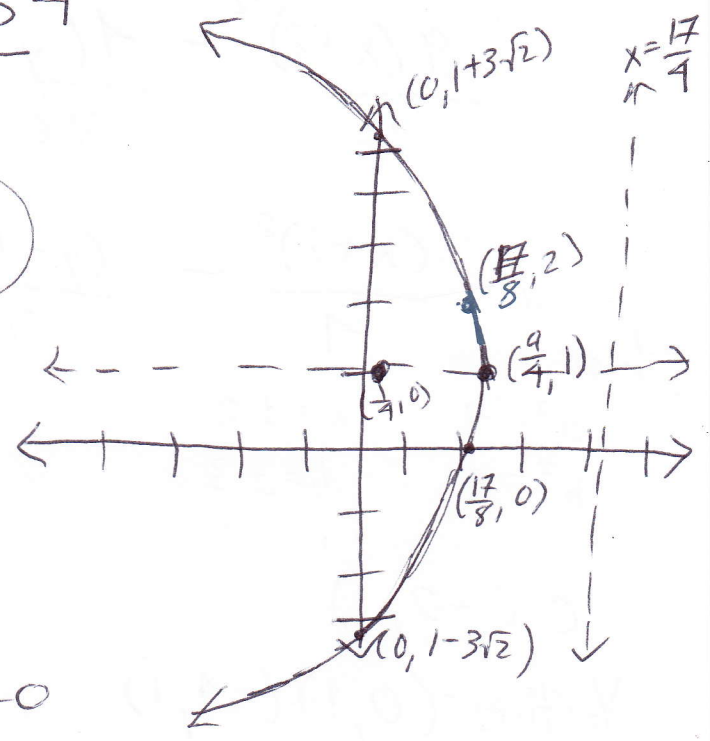
$$x - \frac{9}{4} = -\frac{1}{8}(-1)^2 = -\frac{1}{8} \quad x = -\frac{1}{8} + \frac{9}{4} = \frac{17}{8}$$

y-int  $x = 0$

$$-8\left(-\frac{1}{8}(y-1)^2\right) = \left(-\frac{9}{4}\right)(-8)$$

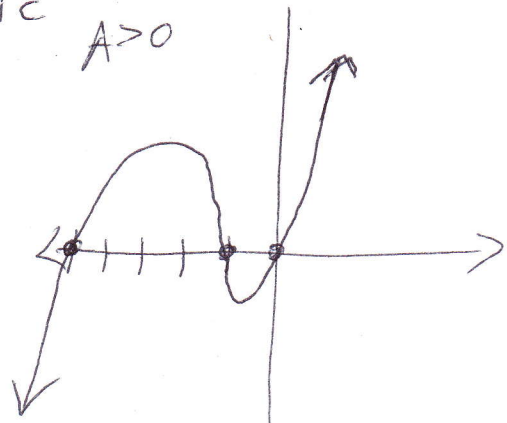
$$(y-1)^2 = 18$$

$$y = 1 \pm 3\sqrt{2}$$



3) a)  $f(x) = x^3 + 6x^2 + 5x$  Cubic  $A > 0$

Zeros  $x(x^2 + 6x + 5) = 0$   
 $x(x+5)(x+1) = 0$   
 $x = 0, -5, -1$   
 $(0,0) (5,0) (-1,0)$

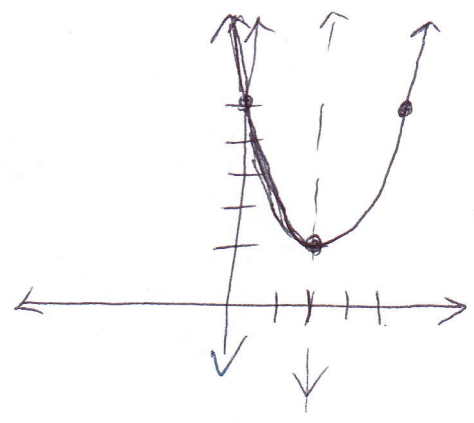


Y-int  $(0,0)$   $D: (-\infty, \infty)$   $R: (-\infty, \infty)$

Not a parabola so no vertex.

b)  $f(x) = (x-2)^2 + 1$  Quadratic  $A > 0$

Zeros:  $(x-2)^2 + 1 = 0$   
 $(x-2)^2 = -1$  Imaginary  
 $x = 2 \pm i$  None



Y-int:  $x=0$   $(0-2)^2 + 1 = 4 + 1 = 5$   
 $(0,5)$

$D: (-\infty, \infty)$

$R: [1, \infty)$

Vertex  $(h,k) (2,1)$

4)  $y - x = 1 \rightarrow y = x + 1$

$y = x^2 - 2x - 3$   
 $x + 1 = x^2 - 2x - 3$   
 $x^2 - 3x - 4 = 0$

$(x-4)(x+1) = 0$

$x = 4, -1$

$y = 4 + 1 = 5$   $y = -1 + 1 = 0$

P.O.I.

$(4,5) (-1,0)$