1. 
$$f(x) = e^{x/2} - 5x$$
,  $x_1 = 6$   
 $f'(x) = \frac{1}{2}e^{x/2} - 5$ 

$$\times_{n+1} = \times_n = \frac{f(x_n)}{f'(x_n)}$$

$$f(x_1) = -9.914$$
  $f'(x_1) = 5.043$ 

$$\times 2 = 6 - \frac{(-9.914)}{5.043} = 7.966$$

$$\times_3 = 7.966 - \frac{13.848}{21.839} = 7.332$$

$$\times_4 = 7.332 - \frac{2435}{14.548} = 7.165$$

$$f(x_4) = 0.738, f'(x_4) = 12.982$$

$$x_s = 7.165 - \frac{0.138}{12.982} = 7.154$$

$$f(x_s) = -0.004$$
  $f'(x_s) = 12.883$ 

$$\times_{6} = 7.154 - \frac{(-0.064)}{12.883} = 7.154$$

The root with 2 decimal digits correct:

2.(a) 
$$y' = 6t^2 - 42t + 60 = 6(t-2)(t-5)$$
  
 $y'' = 12t - 42$   
when  $t=2$ ,  $y=61$ ,  $y'=0$ ,  $y'' \neq 0$ . Hence  $(2,61)$  is a maximum point  
when  $t=5$ ,  $y=34$ ,  $y'=0$ ,  $y'' \neq 0$ . Hence  $(5,34)$  is a minimum point  
when  $t=3.5$ ,  $y'' \neq 0$  and  $y'$  is decreasing  
when  $t=3.5$ ,  $y'' \neq 0$  and  $y'$  is increasing

The concavity changes at to3.5. When t=35, y=47.5 so (3.5, 47.5) is a print of inflexion.

+	2	)_	3.5		5	
y'	+ 0	)		_	0+	
411	_		Ø	+	+	
	1	3				
max					min	

(b) 
$$y = t^3 - t$$
  
 $y' = 3t^2 - 1$   
 $y'' = 6t$ 

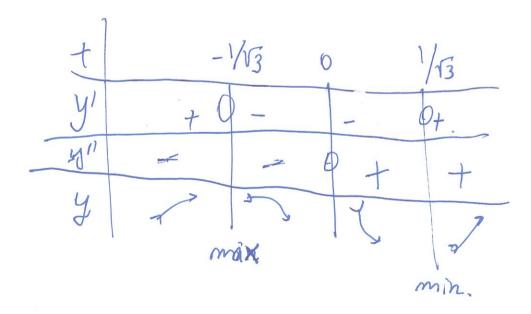
When t=1/13, y=-2/3/3, y'=0, y"70, so (1/13,-2/3/5)

is a minimum point

when +=-1/13, y=2/3/3, y'=0, y'1/2030 (-1/13,2/3/3) is a maximum point

when t<0, y"<0 and y'15 decreasing when +70, y 1170 and y 15 mereasing

The concavity changes at t=0, so (90) is a point of inflexion



(c) Similar

(0,2) minimum

3. (a) 
$$y'' = x^3 - y^2$$
  $y''(0) = -1$   
 $y''' = 3x^2 - 2yy'$   $y'''(0) = -2(1)(-1) = 2$   
 $P_3(x) = 1 - x - \frac{x^2}{2} + \frac{2x^3}{3!}$   
 $P_3(0.25) = 0.7240$ 

(b) 
$$y^{(4)} = 6x - 2yy'' - 2(y')^{2}$$
$$y^{(4)}(0) = (-2)(1)(-1) - 2(-1)^{2} = 0$$
$$P_{4}(0.25) = a7240 \text{ as in (a)}.$$

$$-4-(9)$$
  $B(x)=1-\frac{k^2x^2}{2}$ 

(b) For example
$$P_3(x) = 1 - 2x^2 \quad (by setting k = 2)$$