

SECTION A

QUESTION 1

1. $2x^2 + x = 2$

$2x^2 + x - 2 = 0$

$x = \frac{-1 \pm \sqrt{17}}{4}$

$x = 0,78$ or $x = -1,28$

$(2x-5) = (2x-5)$

$(2x-5)(1 - (2x-5)) = 0$

$x = 5/2$ or $x = +3$

3) $32x + 1 - 4 \cdot 3x = -1$

$32x \cdot 3 - 4 \cdot 3x = 0$

$(3x-1)(3 \cdot 3x-1) = 0$

$3x = 1$ or $3x = 1/3$

$x = 0$ or $x = 1/3$

b) $4 \cdot 3^{2n+1} - 6 \cdot 3^{2n-1}$

$3^{2n+1} - 3^{2n}$

$= 4 \cdot 3^{2n} \cdot 3 - 6 \cdot 3^{2n} \cdot 3^{-1}$

$3^{2n} \cdot 3 - 3^{2n}$

$= 3^{2n} (4 \cdot 3 - 6 \cdot 3^{-1})$

$3^{2n} (3 - 1)$

$= 2 \cdot 3^{2n}$

c) $x = \frac{-2 \pm \sqrt{m-8k}}{2}$

2) $m = (2)^2 = 4$

2) $a = 1$

3) $m - 8k > 0$

3) $4 - 8k > 0$

d) $y = x^2 - 5x + 18$

$y = p \cdot x + r$

$x^2 - 5x - px + 18 - r = 0$

$x^2 - x(5+p) + 18 - r = 0$

$6^2 - 4ac < 0$

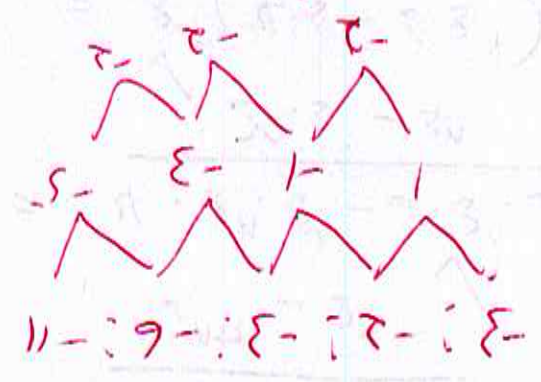
5) $(-5+p)^2 - 4(1)(18) < 0$

$25 + 10p + p^2 - 72 < 0$

$(p+13)(p-3) < 0$

$-13 < p < 3$

Question 2



a) $T_n = -2n + 3$ (3)

b) $T_{135} = -2(135) + 3$ (2)

$= -267$

c) $2c = -2$
 $3a + b = 1$
 $a = -1$
 $b = 4$

$a + b + c = -3$
 $c = -6$

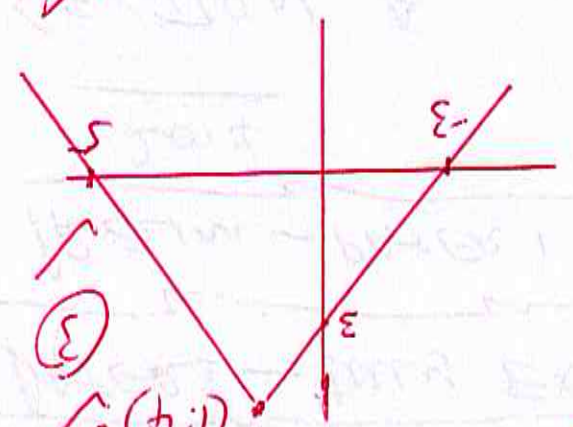
(4)

$T_n = -n^2 + 4n - 6$

$f'(n) = -2n + 4 = 0$
 $n = 2$

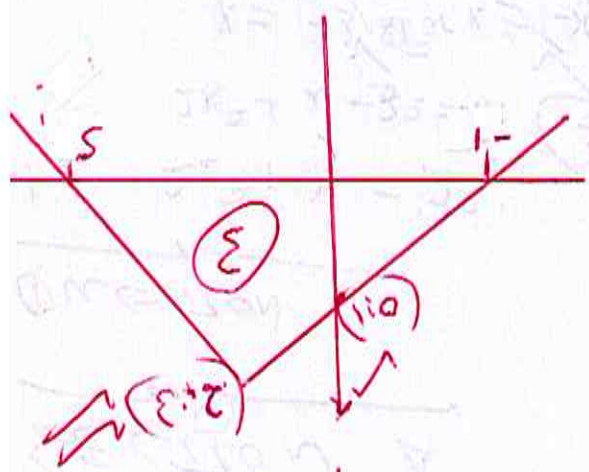
∴ Max value $-(2)^2 + 4(2) - 6 = -2$

Question 3



(1:4) (3) (3)

a)



(2:3) (3)

b)

Question 4

a) $f(x) = -2x^2 + 3x$
 $f(x+2) = -2(x+2)^2 + 3(x+2)$
 $f(x) = \lim_{h \rightarrow 0} \frac{-2x^2 + 3x - (-2(x+2)^2 + 3(x+2))}{h}$

$= \lim_{h \rightarrow 0} \frac{-4x + 3}{h}$ (5)

b) $\lim_{x \rightarrow 1} \frac{x^2 + x - 2}{1 - x} = \lim_{x \rightarrow 1} \frac{(x+2)(x-1)}{1-x}$ (3)

$$\therefore 115 = \frac{2+2c + 14(-3+2c)}{-40+29c}$$

$$a = 2 + c$$

$$a \cdot 2(-3+2c) = -415$$

$$d = -3 + 2c$$

$$3d = -9 + 6c$$

$$\textcircled{1} \textcircled{2}$$

$$\textcircled{5}$$

$$b = a + 5d = -13 + 11c$$

$$a) \quad b = a + 2d = -4 + 5c$$

QUESTION 8

\therefore Total future value = 34530.84

$$F_2 = 2000 \left[\frac{(1 + 10.21\%)^2 - 1}{10.21\%} \right] = 13639.93$$

$$\textcircled{7} \quad \left(1 + \frac{r}{2}\right)^2 = \left(1 + 0.1\right)^2$$

$$= 20890.41$$

$$b) \quad F = 500 \left[\frac{(1 + 10.10\%)^6 - 1}{10.10\%} \right]$$

$$8(-3) + 4b = 11$$

$$b = 35/4$$

$$\textcircled{6} \quad \therefore 4a = -12$$

$$a = -3$$

$$g'(x) = 12a + 4b = -1$$

$$g'(x) = 34x^2 + 26x$$

$$f'(x) = -1$$

$$f'(x) = -4/x^2$$

$$g(x) = 8a + 4b = 11$$

$$f(x) = \frac{x}{4} + a$$

$$g(x) = 11x^3 + 6x^2$$

QUESTION 9

$$500 = \frac{1}{1 - \frac{1}{2}} = 2$$

$$\textcircled{3}$$

$$2) \quad \sum_{k=1}^{\infty} 2(3x-1)^k \quad \text{if } |x| < 1/3$$

$$0 < 3x < 2$$

$$0 < x < 2/3$$

$$\textcircled{4}$$

$$-1 < 3x - 1 < 1$$

$$-1 < r < 1$$

$$b) \quad 2(3x-1) + 2(3x-1)^2 + \dots$$

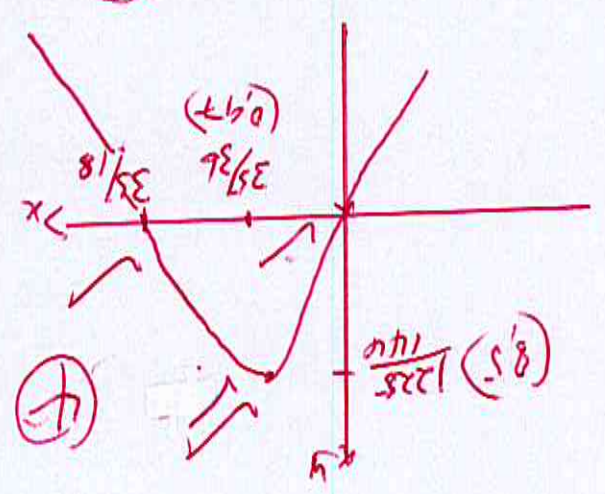
$\frac{d^2p}{dx^2} = 24x - 48$
 $p''(x) = 24x^2 - 48$
 $= -48 < 0$

Stationary points
 $p'(x) = 12x^2 - 48x + 144 = 0$
 $x = 6, x = 2$
 $y = 0$

$p = x(12 - 2x)^2$
 $= x(144 - 48x + 4x^2)$
 $= 4x^3 - 48x^2 + 144x$

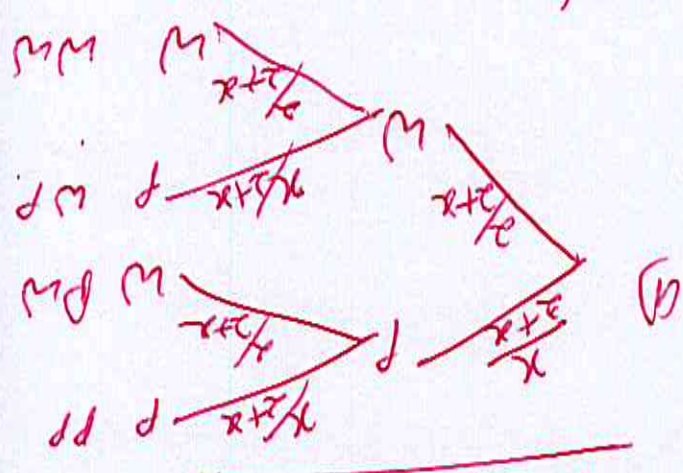
Question 10

$x \leq 0 : 35 \leq x \leq 35 \frac{1}{18}$



$g(x) = -3x^3 + 35 \frac{1}{4} x^2 - 7$
 $g'(x) = -9x^2 + 35 \frac{x}{2}$

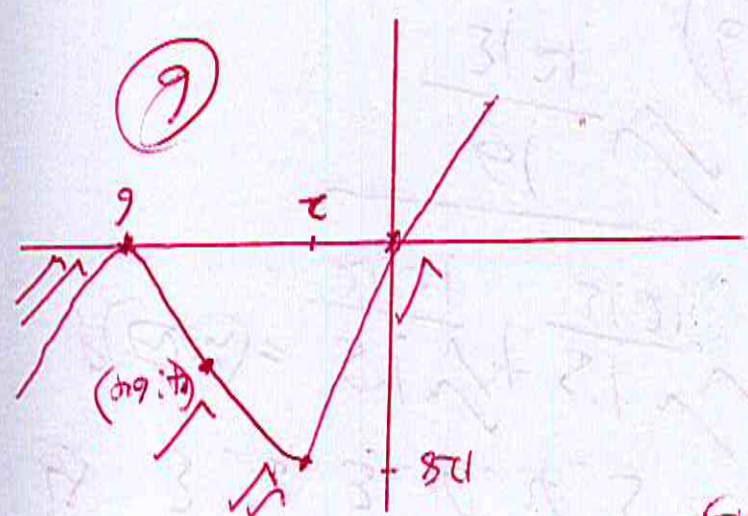
$x = 6$
 $4x = 0.375(2+x)^2$
 $p'(x) = \left(\frac{x}{2+x}\right) + \left(\frac{x}{2+x}\right) = 0.375$



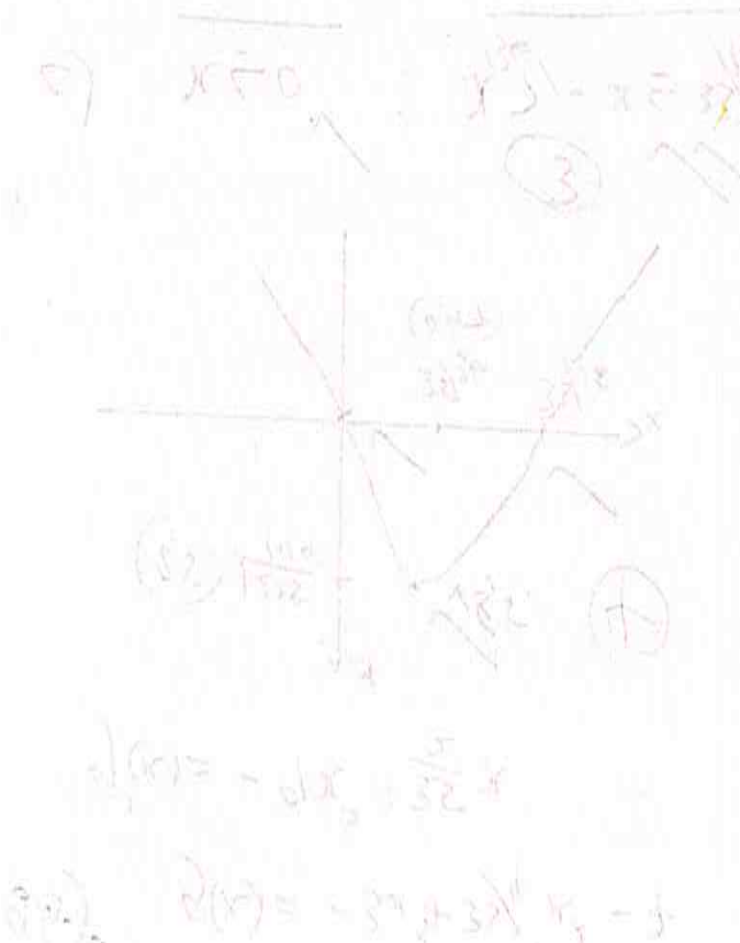
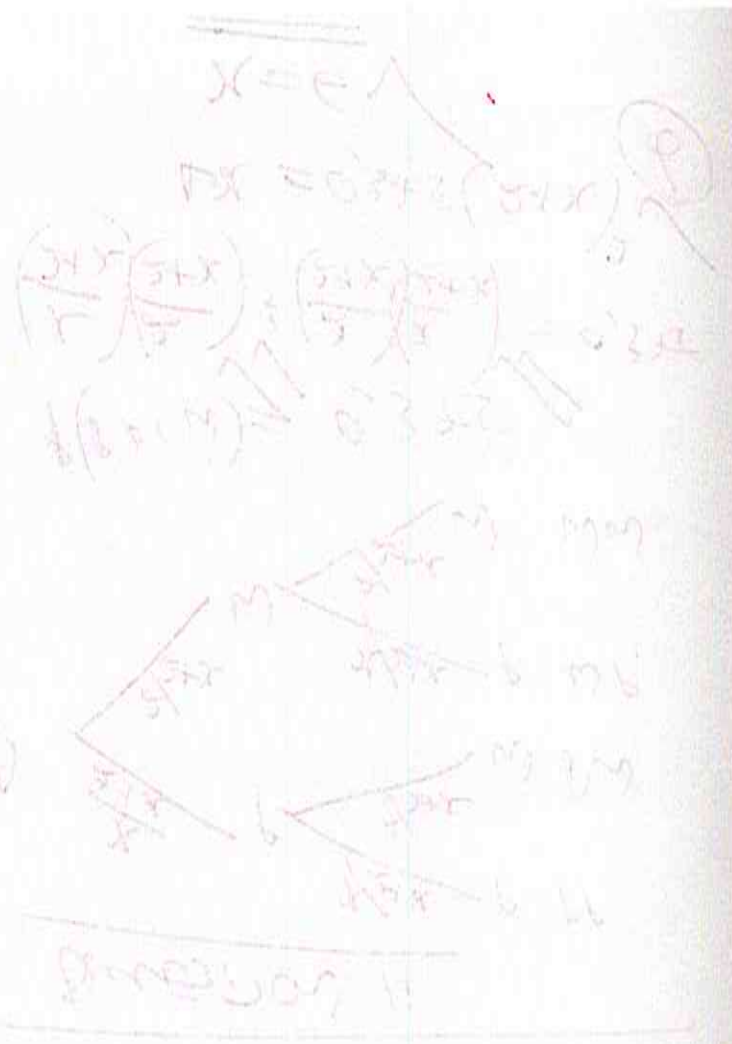
Question 11

Point of inflection
 $(4; 64)$

$p'(x) = k$
 $k = -48$



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



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