(1.) a) i) $f(g(x))$

$= f(2x-3)$ ✓

$= 2(2x-3)+3$

$= 4x-6+3$

$= 4x-3$ ✓

ii) $g(f(x))$

$= g(2x+3)$

$= 2(2x+3)-3$

$= 4x+6-3$

$= 4x+3$ ✓

Tot /26

/3

b) $f(g(x)) \times g(f(x))$

$= (4x-3)(4x+3)$

$= 16x^2-9$ ✓

Least value of $16x^2$ is zero

so least value of $16x^2-9$ is $\underline{\underline{-9}}$ ✓

/2

(2.) $A(t) = 0.88A_0$

$\Rightarrow 0.88A_0 = A_0 e^{-0.000124t}$

0.88 ✓ $= e^{-0.000124t}$

$\ln 0.88$ ✓ $= -0.000124t$

$\frac{\ln 0.88}{-0.000124}$ ✓ $= t$

$t = 1030.91$ ✓ years (to 2dp)

Yes claim is true as tree is over 1000 years old at an age of 1030.91 years. ✓

/5

3. $(x^3 - x^2 - 5x - 3) \div (x+3)$

-3 | 1 -1 -5 -3

	-3	12	-21
1	-4	7	-24

remainder is -24 ✓ ½

4. $6 + x - x^2 < 0$

consider $6 + x - x^2 = y$

let $y = 0$

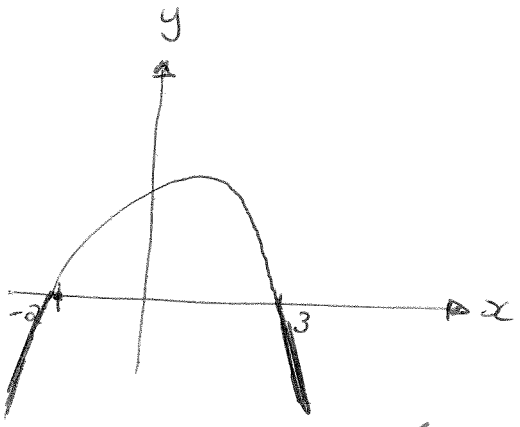
$6 + x - x^2 = 0$

$x^2 - x - 6 = 0$

$(x+2)(x-3) = 0$

$x = -2, \quad x = 3$ ✓

$x < -2, \quad x > 3$ ✓



½

5. a) $2x^2 + 4x - 3$ ✓

$= 2(x^2 + 2x - 3/2)$

$= 2((x^2 + 2x + 1) - 1 - 3/2)$

$= 2((x+1)^2 - 5/2)$ ✓

$= 2(x+1)^2 - 5$ ✓ /3

b) TP $(-1, -5)$ ✓ ✓

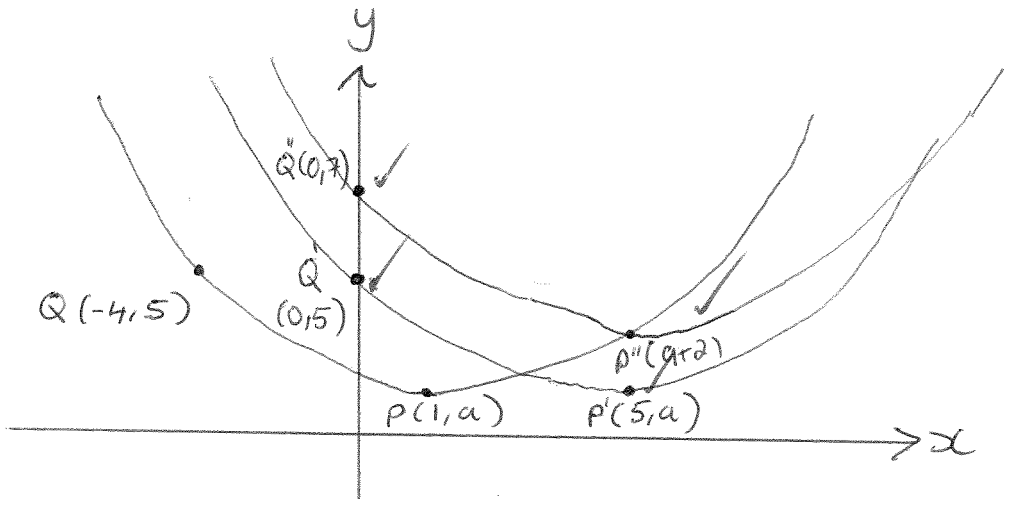
1/1

(6.)

a) $Q(-4,5) \rightarrow (0,5) \rightarrow (0,7)$

$P(1,a) \rightarrow (5,a) \rightarrow (5,a+2)$

1/2 1/2



(7.) $kx^2 + kx + 6 = 0$

For equal roots $b^2 - 4ac = 0$ ✓

$ax^2 + bx + c = 0$

$a = k \quad b = k \quad c = 6$

$k^2 - 4 \times k \times 6 = 0$ ✓

$k^2 - 24k = 0$

$k(k - 24) = 0$ ✓

$k = 0$, $k = 24$ ✓

NA

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