

ALGEBRA MIN. COMPETENCE SOLUTIONS

①a) $\log_5 7a + \log_5 2b = \log_5 14ab$

②a) $\log_2 (x-5) = 5$

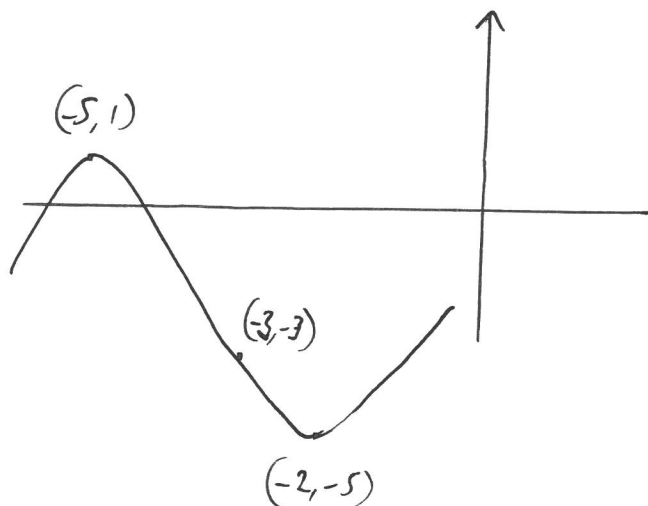
$$2^5 = x - 5$$

$$x - 5 = 32$$

$$\underline{x = 37}$$

③a)

Orig Points	$f(x+3)$ 3 ←	-2 ↓ -2
$(-2, 3)$	$(-5, 3)$	$(-5, 1)$
$(0, -1)$	$(-3, -1)$	$(-3, -3)$
$(1, -2)$	$(-2, -2)$	$(-2, -5)$



$$(4) \text{ a) } y = \log_b(x-a)$$

$$\text{a) } (4, 0) \quad 0 = \log_b(4-a)$$

$$b^0 = 4-a$$

$$1 = 4-a$$

$$-a = -3$$

$$\underline{\underline{a = 3}}$$

$$y = \log_b(x-3)$$

$$\text{a) } (8, 1) \quad 1 = \log_b(8-3)$$

$$1 = \log_b 5$$

$$b^1 = 5$$

$$\underline{\underline{b = 5}}$$

$$(5) \quad g(f(x)) = g(2x+5)$$

$$h(x) = \underline{\underline{\sqrt{2x+5}}}$$

(P) Cannot take square root of a negative

$$\Rightarrow 2x+5 \geq 0$$

$$2x \geq -5$$

$$\underline{\underline{x \geq -2.5}}$$

$$\textcircled{6} \textcircled{a} \quad f(x) = 6x + 7$$

$$y = 6x + 7$$

At inverse .

$$x = 6y + 7$$

$$6y = x - 7$$

$$y = \frac{x-7}{6}$$

$$\text{So } \underline{\underline{f^{-1}(x) = \frac{x-7}{6}}}$$

$$\textcircled{7} \textcircled{a} \quad f(x) = x^3 - 3x^2 - 6x + 8$$

$$\begin{array}{r|rrrr} 1 & 1 & -3 & -6 & 8 \\ & & 1 & -2 & -8 \\ \hline & 1 & -2 & -8 & 0 \end{array}$$

Remainder = 0

$\Rightarrow x-1$ is a factor.

$$\textcircled{b} \quad x^3 - 3x^2 - 6x + 8$$

$$= (x-1)(x^2 - 2x - 8)$$

$$= (x-1)(x-4)(x+2)$$

$$(c) \quad f(x) = 0$$

$$(x-1)(x-4)(x+2) = 0$$

$$x-1 = 0 \quad x-4 = 0 \quad x+2 = 0$$

$$\underline{\underline{x = 1 \quad x = 4 \quad x = -2}}$$

(8)

• $x+2$ is a factor

• $x+6$ is a factor

• $x+3$ is a factor

\Rightarrow Cubic is $(x+2)(x+6)(x+3)$

$$f(x) = (x+2)(x+6)(x+3)$$

$$f(x) = 0$$

$$(x+2)(x+6)(x+3) = 0$$

$$x+2 = 0 \quad x+6 = 0 \quad x+3 = 0$$

$$\underline{\underline{x = -2 \quad x = -6 \quad x = -3}}$$

(9)

Equal roots $\Rightarrow b^2 - 4ac = 0$

$$a = k, \quad b = 3, \quad c = 3$$

$$3^2 - 4(k)(3) = 0$$

$$9 - 12k = 0$$

$$12k = 9$$

$$k = \frac{9}{12} = \underline{\underline{\frac{3}{4}}}$$

$$(10) \text{ a) } U_{n+1} = m U_n + c$$

$$4 = 2m + c$$

$$14 = 4m + c$$

$$14 = 4m + c \quad (1)$$

$$4 = 2m + c \quad (2)$$

$$(1) - (2)$$

$$10 = 2m$$

$$m = 5$$

Sub $m = 5$ into (1)

$$14 = 4(5) + c$$

$$14 = 20 + c$$

$$c = -6$$

$$\underline{\underline{U_{n+1} = 5U_n - 6}}$$

$$(11) \text{ a) i) } U_{n+1} = 0.2 U_n + 300$$

(ii) Limit as $-1 < 0.2 < 1$

At limit $L = 0.2L + 300$

$$0.8L = 300$$

$$L = \frac{300}{0.8} = \underline{\underline{375g}}$$

$$375 < 390$$

so no danger