

$$Q1) \log_4(x+2) = 1 - \log_4(x-1)$$

$$\log_4(x+2) = \log_4 4 - \log_4(x-1)$$

$$x+2 = \frac{4}{x-1}$$

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

$$x^2 + x - 2 = 4$$

$$x^2 + x - 6 = 0$$

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

$$x = -3 \text{ or } 2$$

But the domain of given function

is $x+2 > 0$ and $x-1 > 0$

$$x > -2$$

$$x > 1$$

hence value of

$x=2$ is the correct of the two.

$$\textcircled{Q2} \quad A = A_0 e^{-0.35n}$$

$$0.1 A_0 = A_0 e^{-0.35n}$$

$$e^{0.35n} = 10$$

$$n = \frac{\ln 10}{0.35}$$

$$= 6.579 \text{ days.}$$

$\textcircled{Q3}$

$$P(m) = 27 + 0.48 \cdot \ln(m+1)$$

$$P^{-1}$$

$$0.48 \ln(m+1) = P - 27$$

$$\ln(m+1) = \frac{P-27}{0.48}$$

$$m = e^{\frac{100(P-27)}{48} - 1}$$

$$P^{-1} = e^{\frac{100(P-27)}{48} - 1}$$

P^{-1} indicates distance from the eyes of a severe hurricane in terms of biometric pressure P .

Q4) Natural log equation
 $y = \log_e x$ has $(0, \infty)$

If we transform it like.

$y = \log_e (x)$, we get $(-\infty, 0)$

by writing as $y = \log_e (-x-2)$,

we get domain of $(-\infty, -2)$

from the transformation rule;

$f(x) \rightarrow f(x) + a$ vertical shift by a units

for the function $y = \log_e (-x-2)$

$y \rightarrow y+3$ 3 units up.

hence.

the equation of a natural graph
whose domain is $(-\infty, -2)$.

and has shifted 3 units up

is $y = \log_e (-x-2) + 3$.

Q5) $f(x) = \sqrt{9-x^2}$ and
 $g(x) = \sqrt{9-x^2}$

$$f(x) = \sqrt{9-x^2}$$

$$\text{let } f(x) = y$$

$$y = \sqrt{9-x^2} \text{ by interchanging } x \text{ and } y$$

$$x = \sqrt{9-y^2}$$

$$x^2 = 9-y^2$$

$$y^2 = 9-x^2$$

$$y = \sqrt{9-x^2}$$

$$f^{-1}(x) = \sqrt{9-x^2}$$

So, for $f(x)$ and $g(x)$, one is
inverse of the other.

$$Q6) f(x) = \frac{1}{3\sqrt{2x-1}}$$

$$f(x) = \frac{1}{3\sqrt{2x-1}}$$

we find the domain by where the function is defined, so domain is

$$\left\{x / x > \frac{1}{2}\right\}$$

$$\text{ie } \left(\frac{1}{2}, \infty\right).$$

$$Q7) f(x) = x\sqrt{1-x^2}.$$

a function is even if

$$f(x) = f(x) \text{ for all } x \text{ and}$$

a function is odd if

$$f(-x) = -f(x) \text{ for all } x.$$

Given the function $f(x) = x\sqrt{1-x^2}$.

$$f(-x) = -x\sqrt{1-(-x)^2}$$

$$f(-x) = -x\sqrt{1-x^2}$$

Hence function is odd.

Q8) Coordinates of where graph is passing (1,0)
for horizontal asymptote, $y = -1$

let equation be

$$y = ae^{-bx} + c$$

$$\text{as } x \rightarrow \infty; y \rightarrow -1$$

$$-1 = c$$

$$\text{so, } y = ae^{-bx} - 1$$

$$x=0, y=1$$

$$1 = ae^0 - 1$$

$$a = 2.$$

$$y = 2e^{-bx} - 1$$

$$\text{when } x=1, y=0$$

$$0 = 2e^{-b} - 1$$

$$e^{-b} = \frac{1}{2}.$$

$$y = 2^{(1-x)} - 1$$

$$\Rightarrow y = 2^{(1-x)} - 1$$

$$Q 9) t(L) = -164 \ln \left(1 - \frac{L}{500}\right)$$

$$t = 30 \text{ minutes?}$$

$$30 = -164 \ln \left(1 - \frac{L}{500}\right)$$

$$\frac{-30}{164} = \ln \left(1 - \frac{L}{500}\right)$$

$$1 - \frac{L}{500} = e^{\left(\frac{-30}{164}\right)}$$

$$L = 500 \left(1 - e^{\left(\frac{-30}{164}\right)}\right)$$

$$= .83585$$

$$\approx .84 \text{ words.}$$

$$Q 10) x : e^{ax} = C e^{bx}$$

$$\frac{e^{ax}}{e^{bx}} = C$$

$$e^{x(a-b)} = C$$

$$x(a-b) = \log_e C$$

$$x = \frac{1}{(a-b)} \log_e C$$

Q11) $f(x) = \frac{2-x}{x+2}$

We have to find value of $f(x)^{-1}$

let $y = \frac{2-x}{x+2}$

$$yx + 2y = 2 - x$$

$$yx - x = 2 - 2y$$

$$x(y-1) = 2-2y$$

$$x = \frac{2-2y}{y-1}$$

$$f(x) = \frac{2(1-y)}{y-1}$$

Q12) $f(x) = \frac{1}{x}$

$$\frac{f(x) - f(a)}{x - a}$$

$$f(x) = \frac{1}{x}$$

$$f(a) = \frac{1}{a}$$

$$f(x) - f(a)$$

$$\frac{f(x) - f(a)}{1} = \frac{1}{x} - \frac{1}{a}$$

$$\frac{a-x}{ax} = f(x) - f(a)$$

Sq.

$$\frac{f(x) - f(a)}{(x-a)} = \frac{(a-x)}{ax(x-a)}$$

$$= \frac{-1(x-a)}{ax(x-a)}$$

$$= \frac{-1}{ax}$$