$\cancel{\frac{x}{1}}$

1. $f(x) = (x+8)^2 (x-4)(x+2)^5 (x-1)^2 (x-6)^3$

~~Let a be x-1~~

$\cancel{(a+9)}^2$

$\cancel{x+1}\left[(x+8)(x-1)\right]^2 (x-4)(x+2)^5 (x-6)^3$

$x = -8.7$ to 7.6

$= -9.5779$

2. (a)

The coefficients are 492, -12

There is one change in this case.
This means there is one positive real root.

Substituting $\cancel{x}$ x with $-x$, the polynomial becomes
$-492x - 12$

Coefficients are $-492, -12$

There are 0 changes. and this means there are 0 negative real roots.

1 positive real root
0 negative real roots

(b)

3. $2x^5 - 3x^4 + 51x^3 + 30x^2 + 14x + 156f(1-5i) = 0$

$156f(1-5i) + x\cdot(x(x(2x-3)+51)+30)+14)^{\cdot x} = 0$

$156f(1-5i) + x(2x^4 + 51x^2 + 30x + 14) = 3x^4$

$f(1-5i) = -\frac{x^5}{78} + \frac{x^4}{78} - \frac{17x^3}{52} - \frac{5x^2}{26} - \frac{7x}{58}$

4 Assymptotes:

$x^2 - 3x - 10 = 0$

$x^2 - 5x + 2x - 10 = 0$

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

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

$x = -2 \quad , \quad x = 5$

~~Intercepts~~ ~~Holes of coordinates~~: Intercepts:

$3x^2 - 11x - 4 = 0$

$3x^2 - 12x + x - 4 = 0$

$3x(x-4) + 1(x-4) = 0$

$(3x+1)(x-4) = 0$

$x = \frac{-1}{3} \; ; \; x = 4$ (x-intercepts)

$= -0.3333$

~~Intercepts~~: $y = 3(0)^2 - 11(0) - 4$

$= 0 - 0 - 4$

$\cancel{y = 3x^2 - 11x - 4}$ $= -4$ (y-intercept)

$\cancel{0 = 3x^2 - 11x - 4}$

The x-intercepts are equal to the holes

5. Applying log on both sides

$$(5x-1)\log 2 = \log 3(x+7)$$

$$(5x-1)\log 2 - \log 3(x+7) = 0$$

$$(5x-1)0.3010 - 0.4771(x+7) = 0$$

$$1.505x - 0.3010 - 0.4771x - 3.3397 = 0$$

$$1.505x - 0.4771x = 3.3397 + 0.3010$$

$$\frac{1.204x}{1.204} = \frac{3.6407}{1.204}$$

$$x = 3.0238$$

6. $\log -3(x+4) + \log 6 = 0$

$\log 3(x+4) = \log 6$

$$\frac{0.4771(x+4)}{0.4771} = \frac{0.7782}{0.4771}$$

$x+4 = 1.6314$

$x = -2.3686$

7. <u>y intercepts</u>

$$f(x) = 6\log_4 (x+7) - 3$$

$$f(x) = 6\log_4 (0+7) - 3$$

$$= 6\log_4 (7) - 3$$

$$= 6\log_4 \left(\frac{7}{64}\right)$$

$$= 6\log_4 \left(\frac{7}{64}\right)^6$$

$$4^y = \left(\frac{7}{64}\right)^6$$

$$\ln 4^y = \ln \left(\frac{7}{64}\right)^6$$

$$y = \frac{-13.2778}{1.3863}$$

$$= -9.5779$$

8. $y^2 + 6x + 1 - x = 0$

$$y = \frac{-6 \pm \sqrt{6^2 - 4(1-x)}}{2}$$

$$y = \frac{-6 \pm \sqrt{36 - 4 + 4x}}{2}$$

$$= \frac{-6 \pm \sqrt{32 + 4x}}{2}$$

$$= -\frac{6 \pm \sqrt{4(8+x)}}{2}$$

$$= \frac{-6 \pm 2\sqrt{x+8}}{2}$$

$$f^{-1}(x) = -3 \pm \sqrt{x+8}$$

$$y = -3 + \sqrt{x+8} \quad \text{OR} \quad -3 - \sqrt{x+8}$$

Range $= \{y \in R : y \geq -8\}$

Domain : All real numbers ranging from $(-\infty, -3]$

9. (a) Let the ~~original~~ population be P and the original population be P_0

$$P(t) = P_0 e^{rt}$$

But $P_0 = 30$

In t hours, there are $4t$..

$$P(t) = 30 \cdot 4^{4t}$$

In ~~one~~ five hour, there are 120 bacteria

$$\frac{120}{30} = \frac{30 e^{5r}}{30} \quad (t = 5)$$

$$4 = e^{5r}$$

$$\ln 4 = \cancel{5r} \ln (e^{5r})$$

$$\ln 4 = \cancel{e}\, 5r$$

$$r = \frac{\ln 4}{5}$$

$$= 0.2773$$

$$P(t) = \cancel{e}\, P_0 e^{0.2773t}$$

$$= 30 e^{0.2773t}$$

(b) $P(t) = P_0 e^{0.2773t}$

(c) Given $P(t) = 30e^{0.2773t}$

$t =$ unknown,

$$\frac{5\cancel{270}}{3\cancel{0}} = \frac{3\cancel{0}e^{0.2773t}}{\cancel{3}0}$$

$$175.67 = e^{0.2773t}$$

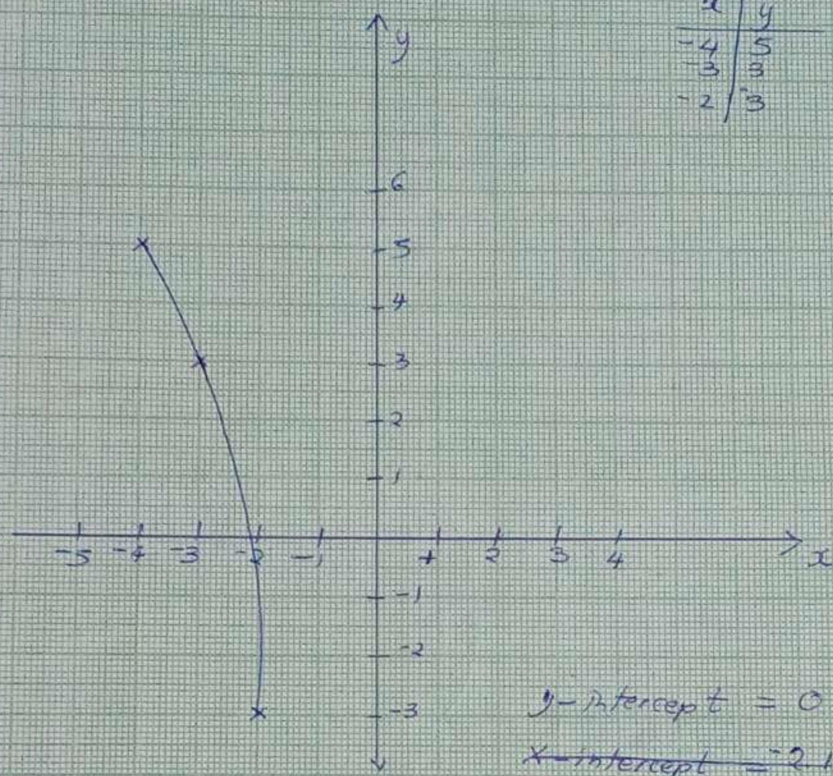
$$\cancel{\ln 175.67 = \ln(e^{0.2773t})}$$

$$\frac{175.67}{1.32} = \frac{1.32t}{1.32}$$

$$t = 133.0833 \cancel{\text{sec}} \text{ hours}$$

6

x	y
-4	5
-3	3
-2	-3

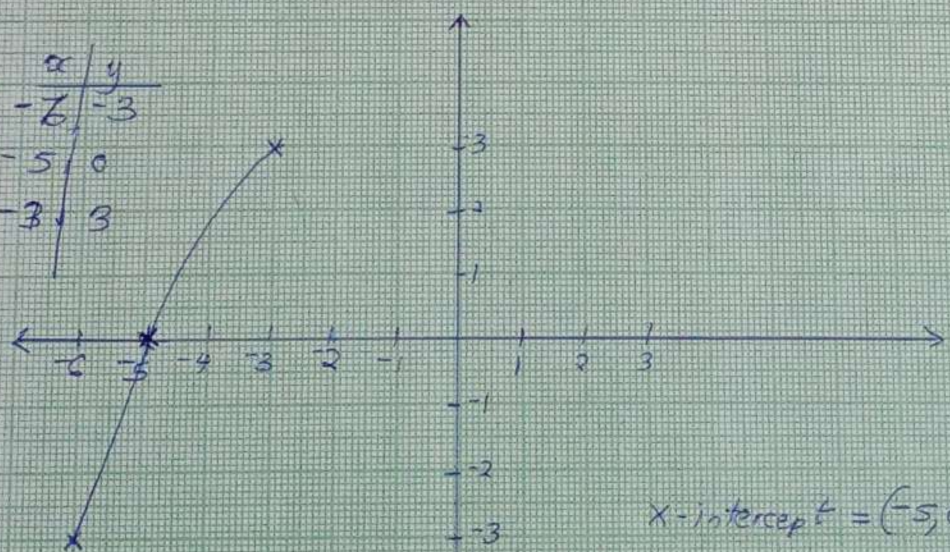


y-intercept = 0

~~x-intercept = -2~~

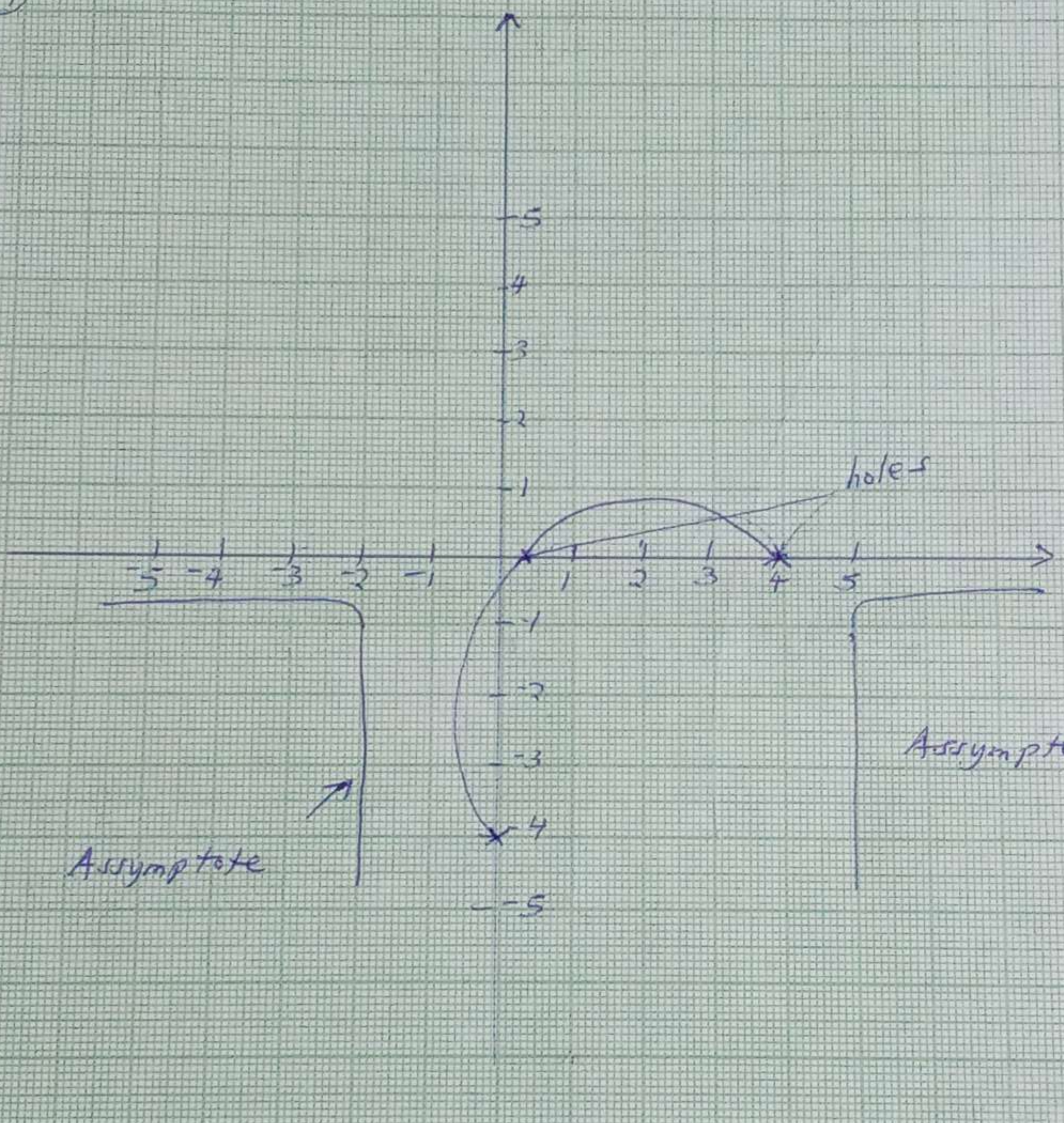
7

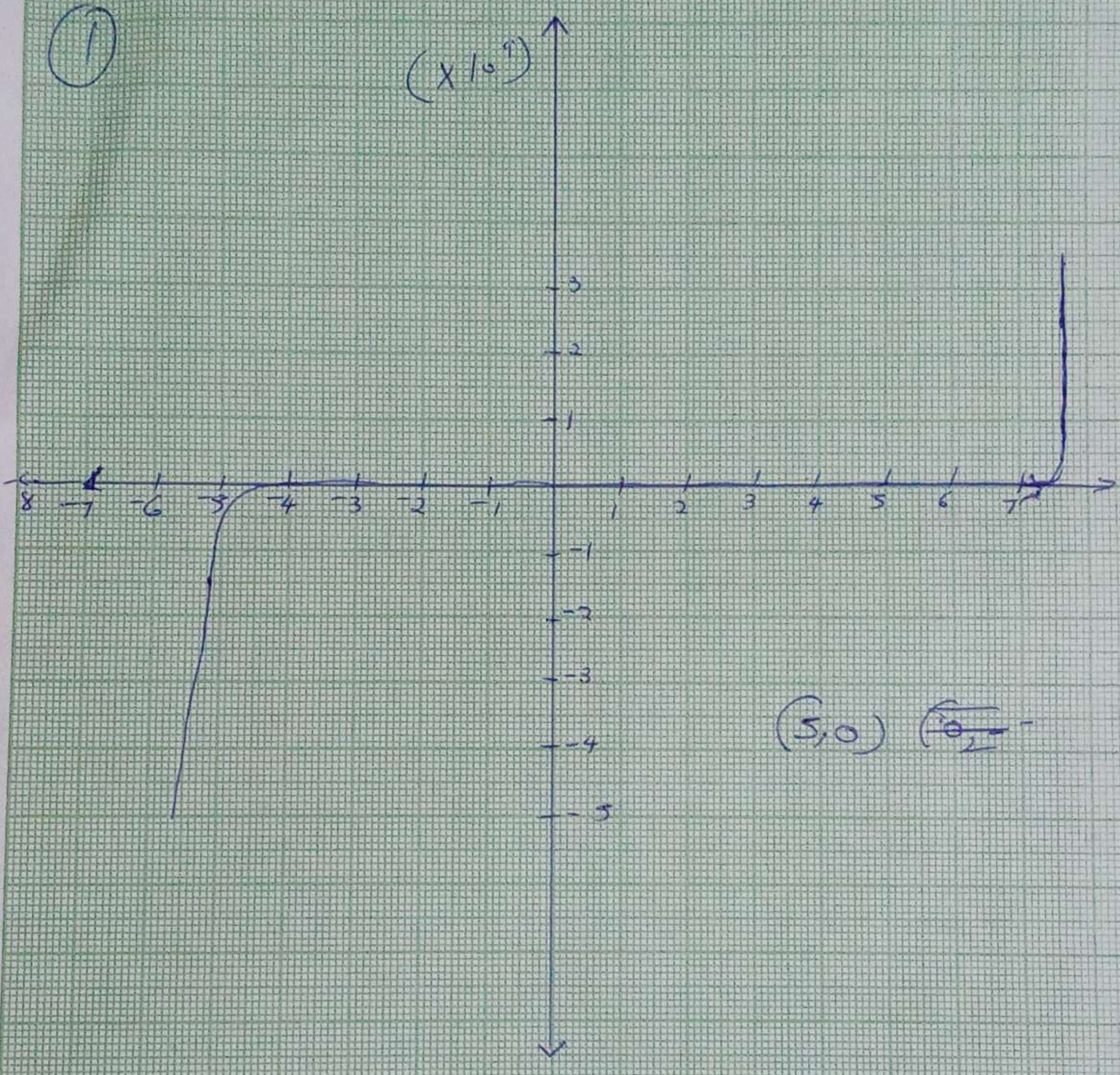
x	y
-6	-3
-5	0
-3	3



x-intercept = $(-5, 0)$

(4)




1
(x 10^9)
(5,0)