Question 4

4.1 $f(x) = -ax^2 + bx + 6$

$y = ax^2 + bx + 6$

$\frac{7}{2} = -a(1)^2 + b(-1) + 6$

$\frac{7}{2} = +a^2 - b + 6 \quad \ldots (1)$

~~$f'(x) = -2ax + b$~~

~~$f'(3) = -2a(3) + b$~~ $f'(3) = 0$

~~$f'(3) = 6a + b$~~

$y = mx + c$

$\frac{7}{2} = (3)(-1) + c$

$c = \frac{13}{2}$

$y = 3x + \frac{13}{2}$

4.2 $0 = -\frac{1}{2}x^2 + 2x + 6$

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

$x = -2 \quad \text{or} \quad x = 6$

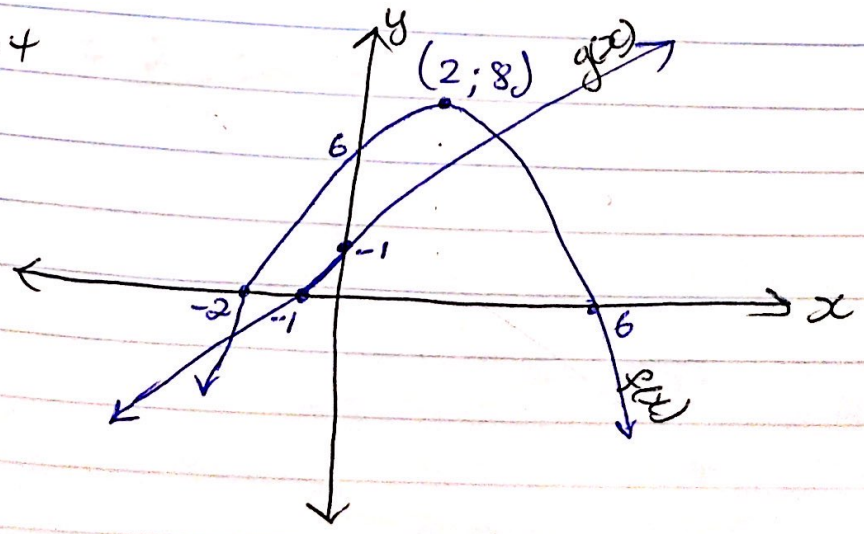
4.3 $x = \frac{-b}{2a}$

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

$f(2) = -\frac{1}{2}(2)^2 + 2(2) + 6 = 8$

$(2; 8)$

4.4



4.5 $x > 0$
$x \leq 2$

4.6 $(-1; 0)$
$(0; -1)$

4.7 $-2 \leq x \leq -1$

Question 6

6.1 $g(x)$: $y = b^x$
$x = b^y$
$\therefore y = \log_b x$

6.2 $y = x$

6.3 $y = b^x$
$y = b^0$
$y = 1$
$P(0; 1)$

6.4 $T(1; 0)$
$m = \frac{0-1}{1-0} = -1$
$R = (\frac{1}{2}; \frac{1}{2})$
$\frac{1}{2} = -1(\frac{1}{2}) + c$
$c = 1$
$y = -x + 1$

6.5 $R(\frac{1}{2}; \frac{1}{2})$
$\frac{1}{2} = b^{\frac{1}{2}}$
$\sqrt[2]{\frac{1}{2}} = \sqrt[2]{b^{\frac{1}{2}}}$
$\frac{1}{4} = b$

Questions

5.1 $y \in \mathbb{R}$ but $y \neq -1$

5.2 $q = -1$

$x + p = 0$

$x = -p$

$x = -2$

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

5.3 $1 = \frac{2}{t-2} - 1$

$2 = \frac{2}{t-2}$

$2t - 4 = 2$

$\frac{2t}{2} = \frac{6}{2}$

$t = 3$

5.4 $f^{-1}(x)$: $y = \log_3 x$

$x = \log_3 y$

$y = 3^x$

5.5 $x < 0$

5.6 $y = -x - 1$

$= -2 - 1$

$-3) - 1 = \log_3 x$

$x = 2$; asymptote

$\log_3 (2) = 0{,}63$

$P(2; 0{,}63)$

Question 9

9.1 $y = a(x-x_1)^2(x-x_2)$

$0 = a(x+1)^2(x-3)$

$0 = a(x^2+2x+1)(x-3)$

$-6 = a(0^2+2(0)+1)(0-3)$

$-6 = a(1)(-3)$

$\frac{-6}{-3} = \frac{-3a}{-3}$

$a = 2$

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

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

$y = 2(x^3-3x^2+2x^2-6x+x-3)$

$y = 2x^3-6x^2+4x^2-12x+2x-6$

$y = 2x^3-2x^2-10x-6$

$\therefore b = -2 \quad c = -10 \quad \& \quad d = -6$

9.2 $f(x) = 2x^3-2x^2-10x-6$

$f'(x) = 6x^2-4x-10$

$f'(x) = 0$

$0 = 6x^2-4x-10$

$x = \frac{-(-4) \pm \sqrt{(-4)^2-4(6)(-10)}}{2(6)}$

$x = \frac{5}{3}$ or $x = -1$

$f\left(\frac{5}{3}\right) = 2\left(\frac{5}{3}\right)^3-2\left(\frac{5}{3}\right)^2-10\left(\frac{5}{3}\right)-6$

$= -\frac{512}{27}$

$\therefore B\left(\frac{5}{3}; -\frac{512}{27}\right)$

9.3 $h(x) = 2x^3-2x^2-10x-6-(+6x-6)$

$h(x) = 2x^3-2x^2-16x+0$

$h'(x) = 6x^2-4x-16$

$h'(x) = 0$

$$0 = 6x^2 - 4x - 16$$

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(6)(-16)}}{2(6)}$$

$x = 2$ or $x = -\frac{4}{3}$

$x < 0$ where $x = -\frac{4}{3}$

Question 9

9.1 $E(0; -4)$

9.2 $y = a(x - x_1)(x - x_2)$

$y = a(x + 2)(x - 6)$

$-4 = a(0 + 2)(0 - 6)$

$-4 = a(2)(-6)$

$\frac{-4}{-12} = \frac{-12a}{-12}$

$\frac{1}{3} = a$

$y = \frac{1}{3}(x + 2)(x - 6)$

$y = \frac{1}{3}(x^2 - 6x + 2x - 12)$

$y = \frac{1}{3}(x^2 - 4x - 12)$

$y = \frac{1}{3}x^2 - \frac{4}{3}x - 4$

9.3 $g'(x) = 0$

$0 = \frac{1}{3}x^2 - \frac{4}{3}x - 4$

$x = \frac{-(-\frac{4}{3}) \pm \sqrt{(-\frac{4}{3})^2 - 4(\frac{1}{3})(-4)}}{2(\frac{1}{3})}$

$x = 6$ or $x = -2$

9.2 $g''(x) = \frac{2}{3}x - \frac{4}{3}$

$g''(x) = 0$

$0 = \frac{2}{3}x - \frac{4}{3}$

$\frac{4}{3} = \frac{2}{3}x$ $\therefore x = 2$

9.5 The graph of $g(x)$ is increasing

Question 10

10.1 ~~$r = 2\pi r$~~

$$\frac{V}{\pi h} = \frac{\pi r^2 h}{\pi h}$$

$$\sqrt{\frac{V}{\pi h}} = \sqrt{r^2}$$

$$\sqrt{\frac{V}{\pi h}} = r$$

~~10.~~

10.2