

CHAPTER 2

(2)

$$f(x) = (x-5)^3$$

$$\text{let } y = (x-5)^3$$

$$\sqrt[3]{y} = x-5$$

$$x = \sqrt[3]{y} + 5$$

$$f^{-1}(x) = \sqrt[3]{x} + 5$$

(3)

$$(a) \quad f(x) = \frac{x+3}{4} \quad g(x) = 8x+5$$

$$g \circ f(x) = 8 \left(\frac{x+3}{4} \right) + 5$$

$$= 2x+6+5$$

$$= 2x+11$$

$$(b) \quad g \circ f^{-1}(x) \Rightarrow$$

$$y = 2x+11$$

$$2x = y-11$$

$$x = \frac{y-11}{2}$$

$$g \circ f^{-1}(x) = \frac{y-11}{2}$$

$$4 = \frac{a-11}{2}$$

$$a = 8+11$$

$$= 19$$

4(a)

Range of $f : [0, 6]$

(b) $g(x) = f(x-5)$

Domain of $f(x) : [-6, -2]$

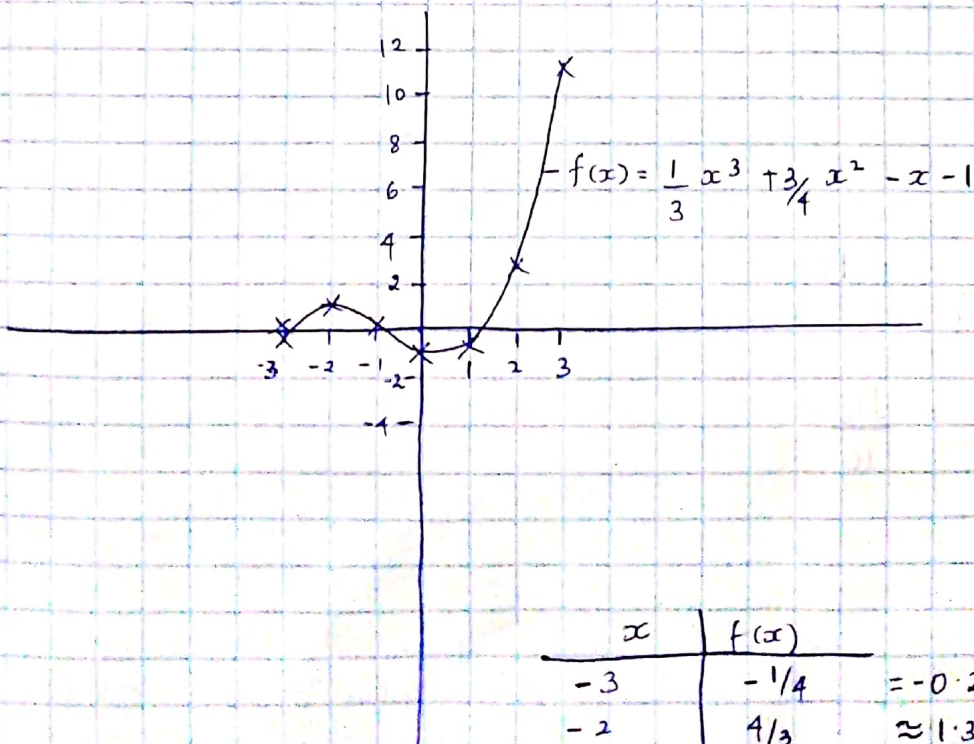
Domain of $g(x) : [-6-5, -2-5]$
 $= [-11, -7]$

5(a) $f(x) = \frac{1}{3}x^3 + \frac{3}{4}x^2 - x - 1$

y-intercept ; when $x=0$

$$y = \frac{1}{3}(0^3) + \frac{3}{4}(0^2) - 0 - 1$$

$$= -1$$

(b) graph of $y=f(x)$ for $-3 \leq x \leq 3$ and $-4 \leq y \leq 12$ 

x	$f(x)$	
-3	$-\frac{1}{4}$	$= -0.25$
-2	$\frac{4}{3}$	≈ 1.33
-1	$\frac{5}{12}$	≈ 0.42
0	-1	
1	$-\frac{11}{12}$	≈ -0.92
2	$\frac{8}{3}$	≈ 2.67
3	$\frac{47}{4}$	$= 11.75$

5

- (c) Local maximum at $x = p$
 Local minimum at $x = q$

$$f'(x) = x^2 + \frac{3}{2}x - 1$$

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

Solving Quadratically, $x = \frac{1}{2}$ or -2

$$f(x) = \frac{1}{3}x^3 + \frac{3}{4}x^2 - x - 1, \quad x = \frac{1}{2}, \quad x = -2$$

$$= \frac{4}{3} \text{ and } -\frac{61}{48}$$

$$\text{Range: } (-\frac{61}{48}, \frac{4}{3})$$

(6)

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

$$f(0.01) = \frac{1}{\sqrt{0.01}} = 10$$

$$f(10) = \frac{1}{\sqrt{10}} = \frac{\sqrt{10}}{10}$$

(b) Let $y = \frac{1}{\sqrt{x}}$

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

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

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

(c) Domain of $f^{-1}(x)$: $(-\infty, 0) \cup (0, \infty)$

Range of $f^{-1}(x)$: $(0, \infty)$

(7)

(a) $f(x) = \frac{4x-1}{2x+a}$ is a self inverse function.

$$f^{-1}(x) = \frac{4x-1}{2x+a}$$

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

$$2xy + ya = 4x - 1$$

$$2xy - 4x = -ya - 1$$

$$x(2y - 4) = -ya - 1$$

$$x = \frac{(-ya - 1)}{2y - 4}$$

$$f^{-1}(x) = \frac{-ya - 1}{2y - 4} \Rightarrow \frac{-xa - 1}{2x - 4}$$

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

$$-xa = 4x$$

Thus $a = -4$

(b) Domain for $f(x)$

$$(-\infty, 2) \cup (2, \infty)$$

(7)

$$(c) \quad fff(x) = \frac{1}{4}$$

$$f(x) = \frac{4x-1}{2x-4}$$

$$\frac{1}{4} = fff(x)$$

$$\frac{4 \left(\frac{4x-1}{2x-4} \right) - 1}{2 \left(\frac{4x-1}{2x-4} \right) - 4}$$

$$4 \left(\frac{4 \left(\frac{4 \left(\frac{x-1}{2x-4} \right) - 1}{2 \left(\frac{4x-1}{2x-4} \right) - 4} \right) - 1}{2 \left(\frac{4 \left(\frac{x-1}{2x-4} \right) - 1}{2 \left(\frac{4x-1}{2x-4} \right) - 4} \right) - 4} \right) - 1 = \frac{1}{4}$$

Solving, $x=0$ Thus $x=0$

Question 1

