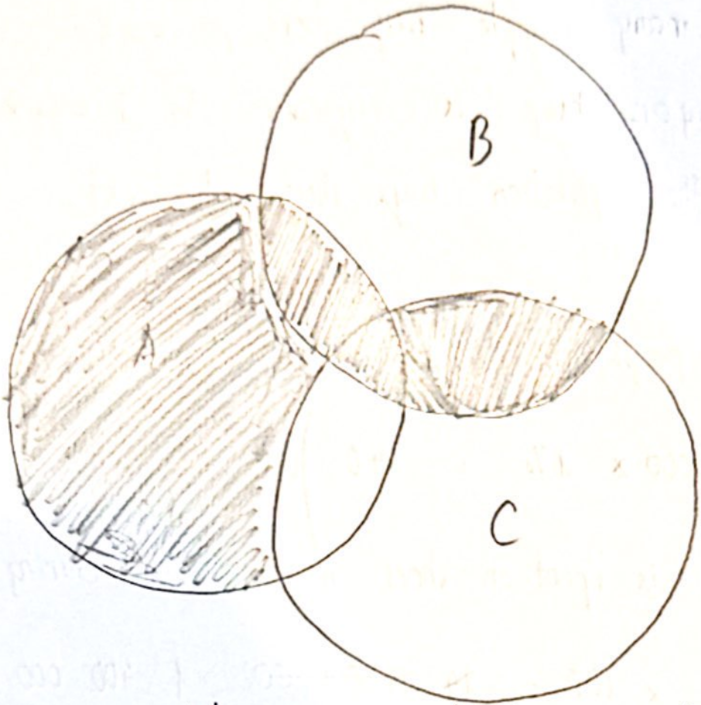
Assigment 1

1)

i) a Venn diagram show $(A \cap B) \cup (A \setminus C) \cup (B \cap C)$



- The parts that are covered by gray color is the answer.

ii) +) $A = \{-1; \frac{1}{2}; 2; 5\}$

+) $B = [0, 2) \in \mathbb{R}$

$\Rightarrow B = \{x \in \mathbb{R} \mid 0 \leq x < 2\}$

+) $C = \{n \in \mathbb{Z} \mid \frac{n+1}{2} \in \mathbb{Z}\}$

$\Rightarrow (n+1)$ is even mean n is old

we have : $(A \cap B) = \{\frac{1}{2}\}$

$(A \setminus C) = \{\cancel{1}; \frac{1}{2}; 2\}$

$(B \cap C) = \{1\}$

$\Rightarrow (A \cap B) \cup (A \setminus C) \cup (B \cap C) = \{$ [illegible] ; [illegible] ; $\frac{1}{2}; 1; 2\}$

Scanned with CamScanner

2)

+) There is nearly 1.4 million people in Adelaide in 2024

+) The cost of a pair of shoes can vary, but I assume that an average price is \$ 100 per pair

+) Estimate how many people buy shoes per week:

- Not everyone buys shoes everyweek. So I assume that around 1 % of the population buys shoes each weeks.

=> The ~~p~~ number of people ~~who~~ buying shoes weekly is:

$$1\,400\,000 \times 1\% = 140\,00 \text{ (people)}$$

=> Money in total is spent on shoes in Adelaide during a week? is:

$$14\,000 \times 100 = \cancel{14}\ \cancel{14\,000\,00}\ 1\,400\,000 \text{ (dollars)}$$

3) function f with domain [0;6]

$$\Rightarrow 0 \le x \le 6$$

$$g(x) = \begin{cases} 2 & \text{if } 0 \le x < 1 \\ \left[\frac{x}{4} + 1\right] & \text{if } x \ge 1 \end{cases}$$

i) $g(f(4))$

We have $f(4) = 3$ so $g(f(4)) = g(3) = \left[\frac{3}{4} - 1\right] = 1$

ii) $f(x) = g(x)$

+) It can be seen that, $0 \le x < 1$, $g(x) = 2$

but in if $0 \le x < 1$, $f(x) > 3$

+) with $1 \le x < 4$, $g(x) = 1$

and $f(x) = 1$ when $x = 2$

so when $x = 2$, $f(x) = g(x)$

+) with $4 \leq x \leq 6$

$g(x) = 2$

and ~~when $4 \leq x \leq 6$, $f(x) = 2$~~

when $x = 5$, $f(x) = 2$

$\rightarrow$ $x = 2$, $f(x) = g(x)$

So $f(x) = g(x)$ when $x \in \{2; 5\}$

III) Assume $\sum_{i=1}^{4} \sum_{j=2}^{3} f(i) g(j) = A$

We have $g(2) = 1$

$g(3) = 1$

$f(1) = 3$

$f(2) = 1$

$f(3) = 3$

$f(4) = 3$

$$A = f(1)\left(\sum_{j=2}^{3} g(j)\right) + f(2) \cdot \sum_{j=2}^{3} g(j) + f(3) \cdot \sum_{j=2}^{3} g(j)$$

$$+ f(4) \sum_{j=2}^{3} g(j)$$

$$A = 3 \times (1+1) + 1 \times (1+1) + 3 \times (1+1) + 3 \times 2$$

$$= 6 + 6 + 6 + 2 = 14 + 6 = 20$$

Scanned with CamScanner