# CSC165H1 Problem Set 0

### Frederick Meneses

### January 18, 2021

## Question 2

- CSC165H1 S Mathematical Expression and Reasoning for Computer Science Lindsey Shorser

- CSC148H1 S Introduction to Computer Science Jonathan Calver

- MAT137Y1 Y Calculus with Proofs Alfonso Gracia-Saz

- MAT223H1 S Linear Algebra I Alfonso Gracia-Saz

- PHL233H1S Philosophy for Scientists Alexander Koo

## Question 3

Let
$$S_1 = \{108, 148, 165, 207, 209, 236, 258, 263, 369, 373\}$$
and
$$S_2 = \{x \mid \exists k \in \mathbb{Z}, x = 4k\}$$
So,
$$S_1 \setminus S_2 = \{165, 207, 209, 258, 263, 369, 373\}$$

# Question 4

| p | q | r | $\neg(p \wedge q \wedge r) \iff (p \implies q)$ |
|---|---|---|---|
| F | F | F | T |
| F | F | T | T |
| F | T | T | T |
| F | T | F | T |
| T | T | T | F |
| T | T | F | T |
| T | F | F | F |
| T | F | T | F |

# Question 5

Using the identity for all $n \in \mathbb{N}$ and all $d, k \in \mathbb{R}$

$$\sum_{i=0}^{n-1}(di + k) = nk + \frac{dn(n-1)}{2}$$

$$\sum_{i=0}^{n-1}(4i - 315) = -315n + \frac{4n(n-1)}{2}$$

We want this to equal 2020 temporarily,

$$2020 = -315n + \frac{4n(n-1)}{2}$$
$$= -634n + 4n^2 - 4040$$

Using the quadratic formula:

$$n = \frac{634 \pm \sqrt{(-634)^2 - 4(4)(-4040)}}{2(4)}$$

$$n \approx \begin{cases} 164.63 \\ -6.13 \end{cases}$$

Since $n \in \mathbb{N}$,

$$n = 165$$

Plugging $n$ back into the equation:

$$-315(165) + \frac{4(165)(165-1)}{2} = 2145 > 2020$$

which was what I wanted to show.