Problem Set 0 Solution

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Question 1

- Solution complete. Please see above

Question 2

- CSC 165
- Mathematical Expression and Reasoning for Computer Science
- David Liu

Question 3

- $S_1 = \{\, x \mid x \in \mathbb{Z},\ x < 30 \,\}$
  $S_2 = \{\, 0, 1, 9, 10, 11, 19, 20, 21, 29, 30, 31 \ldots \,\}$
  So,
  $S_1 \cap S_2 = \{\, 0, 1, 9, 10, 19, 20, 21, 29 \,\}$

Question 4

p	q	r	$\neg q$	$p \vee \neg q$	$p \iff r$	$(p \vee \neg q) \Rightarrow (p \iff r)$
T	T	T	F	T	T	T
T	T	F	F	T	F	F
T	F	T	T	T	T	T
F	T	T	F	F	F	T
T	F	F	T	T	F	F
F	T	F	F	F	T	T
F	F	T	T	T	F	F
F	F	F	T	T	T	T

Question 5

i)

$$\sum_{i=0}^{n-1}(2i+5) = 5n + \frac{2n \cdot (n-1)}{2}$$

$$\sum_{i=0}^{n-1}(2i+5) = 5n + \frac{2n^2 - 2n}{2}$$

$$\sum_{i=0}^{n-1}(2i+5) = n^2 + 5n - n$$

$$\sum_{i=0}^{n-1}(2i+5) = n^2 + 4n$$

ii) Since we know $\sum_{i=0}^{n-1}(2i+5) = n^2 + 4n$ and want to find smallest positive integer n satisfying $\sum_{i=0}^{n-1}(2i+5) \geq 165165$,

$$
\begin{aligned}
n^2 + 4n &\geq 165165 \\
n^2 + 4n + 4 &\geq 165169 \\
(n+2)^2 &\geq 165169 \\
n &\geq \sqrt{165169} - 2 \\
n &\geq 404.409891612 \\
n &\geq 405
\end{aligned}
$$