CS182 Homework # 1

Your Name

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1. *I, Maninder (Kaurman) Kaur, affirm that I have not given or received any unauthorized help on this assignment and that this work is my own. What I have submitted is expressed and explained in my own words. I have not used any online websites that provide a solution. I will not post any parts of this problem set to any online platform and doing so is a violation of course policy.*

2. Common notations: $\leq$, $<$, $\geq$, $>$, $a \equiv b \pmod{n}$, x^y, a_5, $x \bmod n = r$, $x = \frac{p}{q}$
   Quantifiers: $\forall$, $\exists$

   Matrix: $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$

   Table:

p	q	r	$\neg r$	$q \to r$	$p \wedge (q \to r)$	$p \wedge (q \to r) \leftrightarrow \neg r$
F	F	F				
F	F	T				
F	T	F				
F	T	T				
T	F	F				
T	F	T				
T	T	F				
T	T	T				

   Integral and Summations:

$$\int_{-\infty}^{\infty} e^{-x^2}\,dx = \sqrt{\pi}, \qquad \sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}$$

3. Example of a multi-part question.

   (a) $((p \vee (q \to \neg p)) \wedge (p \vee (\neg q \to p))) \vee (p \to q)$

   (b) $\neg(\neg q \vee (\neg(\neg q \wedge p) \wedge q)) \wedge p$

   (c) $(p \to q) \wedge (q \to \neg p)$

   Solution.

   (a)

   (b)

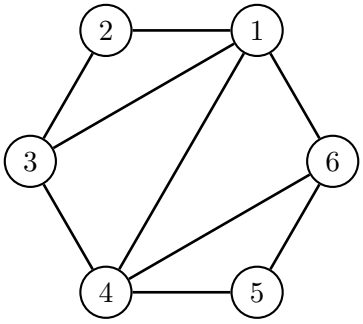
   (c)

4.

$$\begin{aligned} S_n &= 1 + 2 + \cdots + n \\ &= \frac{n(n+1)}{2} \end{aligned}$$

$$\begin{aligned} p \vee (q \vee r) &\equiv (p \vee q) \vee r && \text{Associative Law} \\ &\equiv p \vee (q \wedge r) && \text{Associative Law} \end{aligned}$$

5. This is an example of using tikz to draw an undirected graph.



This is an example of using tikz to draw a directed graph.