

Fall 2017 COT 3100 Final Exam Review Sheet

Recitation Week of 11/27-12/1

- 1) (Set proof) Let A , B , and C be finite sets of integers. Prove or disprove the following assertions:
 - a) If $C \subseteq A \cap B$, then $A - B \subseteq A - C$.
 - b) If $A \cap B \subseteq C$, then $(A - C) \cup (B - C) \cup (A \cap B) = A \cup B$.

- 2) (Counting) How many bit strings of length 12 don't contain a '11' as a substring? (A bit string is a string with only zeroes and ones)

- 3) (Logic) Prove that $[(q \wedge (r \rightarrow \neg q)) \rightarrow \neg r] \wedge [(s \wedge T) \vee (p \vee T)]$ is a tautology using the Laws of Logic.

- 4) (Induction) Prove, using mathematical induction, that for all positive integers n , we have $1+4+7+10+\dots+(3n-2) = \frac{n(3n-1)}{2}$

- 5) (Probability) A factory manufactured 1,000,000 cell phones in 2012, of which 20,000 were defective. In the factory there are two assembly lines, A and B, responsible for manufacturing all of the phones. Assembly line A manufactured 200,000 phones total and assembly line B manufactured 12,000 defective cell phones. Determine the following probabilities:
 - a) Given that a cell phone was manufactured in assembly line A, what is the probability that it is defective? Give your answer as a percentage.
 - b) Given that a cell phone was manufactured in assembly line B, what is the probability that it is defective? Give your answer as a percentage.