ITCS254/258
Test2 Revision

1- Let a an integer not divisible by 3:

a- Show that $x = (a + 1)(a + 2)$ is divisible by 3

b- Show that x^2 is divisible by 3

c- Show by direct proof, that if $2a + b$ is divisible by 6, then 5b – 2a is divisible by 6:

2- Show that if $x^2 + 2x - 8 \geq 0$ $then$ $x \geq 2$ or $x \leq -4$

3- Prove that if n is an integer then if n is odd then 7n+8 is odd

4- Prove by contradiction that for any integer a: if $a^2 - 1$ is odd then a is even

5- Show that the following argument is valid:

$q \wedge \neg s \rightarrow \neg p$

$p \vee s$

$\neg q \rightarrow \neg t$

$\neg s$

$\therefore \neg t \vee s$

6- Show that the following argument is valid:

$\neg p \wedge q$

$r \rightarrow p$

$\neg r \rightarrow s$

$s \rightarrow t$

$\therefore t$

7- Show that the following argument is valid:

$p \rightarrow q$

$r \vee q$

$\neg s \rightarrow \neg t$

$\neg q \vee s$

$\neg s$

$\neg p \wedge r \rightarrow u$

$w \vee t$

$\neg u \wedge w$

8- Show that: $A \cup B = (A \cap B) \cup (A - B) \cup (B - A)$

9- Show using set identities that $\overline{(A \cup B) \cap C} = (\bar{A} \cup \bar{C}) \cap (\bar{B} \cup \bar{C})$

10- Let

$U = \{1,2,3,4,5,6,7,8,9,10\}$

$A = \{2,5\}$

$B = \{5,6,9\}$

a. $|A|$
b. $|B|$
c. $A \cap B$
d. $P(B)$
e. $P(A)$
f. $A \times B$