Math 021 Fundamentals of Math Worksheet I 31-01-06 Name:_____

(please print legibly)

For problems 1 -15 only.

Let $\boldsymbol{U}$ = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11} A = {1, 3, 5}, B = {2, 3, 4}, C = {2, 4, 6, 8}, and D = {2, 5, 9}

1. Find $A \cap B$
2. Find $A \cap B^C$
3. Find $A \cup B$
4. Find $A \cap B \cap C$
5. Find $C \cap B$
6. Find $A \cap A^C$
7. Find $(B \cap D) \cup C$
8. Find $(B \cup D) \cap C$
9. Find $D \cap B$
10. Find $A \cup A^C$
11. Find $D \cup B^C$
12. Find $D \cap B^C$

13. $5 \in D$ Answer 13:_____

A. true B. false C. both true and false D sometimes true, sometimes false E None of these

14. $5 \in C$ Answer 14:_____

A. true B. false C. both true and false D sometimes true, sometimes false E None of these

15. $B \subseteq C$ Answer 15:_____

A. true B. false C. both true and false D sometimes true, sometimes false E None of these

16. Suppose E, F, G are sets in the universe $\boldsymbol{U}$ such that $|\boldsymbol{U}| = 100$, $|E| = 31$, $|F| = 20$, $|G| = 25$, $|E \cap F| = 3$, $|E \cap G| = 7$, $|F \cap G| = 4$, and $|E \cap F \cap G| = 1$. Find $|E \cap (F \cup G)^C|$

17. Suppose E, F, G are sets in the universe $\boldsymbol{U}$ such that $|\boldsymbol{U}| = 100$, $|E| = 31$, $|F| = 20$, $|G| = 25$, $|E \cap F| = 3$, $|E \cap G| = 7$, $|F \cap G| = 4$, and $|E \cap F \cap G| = 1$. Find $|F \cap G^C|$

18. The statement $p \rightarrow q$ is (are) logically equivalent to: Answer 18:_____

A. $\sim p \vee q$ B. $p \vee \neg q$ C. $\sim(p \wedge \sim q)$ D $\neg q \Rightarrow \neg p$ E $\neg q \wedge p$ F $q \Rightarrow p$ G. None of these

19. The negation(s) of the statement $p \rightarrow q$ is (are): Answer 19:_____

A. $\sim p \vee q$ B. $p \vee \neg q$ C. $\sim(p \wedge \sim q)$ D $\neg q \Rightarrow \neg p$ E $\neg q \wedge p$ F $q \Rightarrow p$ G. None of these

20. Suppose A, B, C are sets in the universe $\boldsymbol{U}$. The following statements are true: Answer 20:_____

A. $\varnothing \subseteq A$ B. $\varnothing \subseteq B$ C. $\varnothing \subset A$ D. $A \cap A^C \neq \varnothing$

E. $A \cup B \subseteq B$ F. $A \cup B \cup C = \boldsymbol{U}$ G. $(A \cap B)^C = A \cup B^C$ H. $A \cap B \subseteq B$

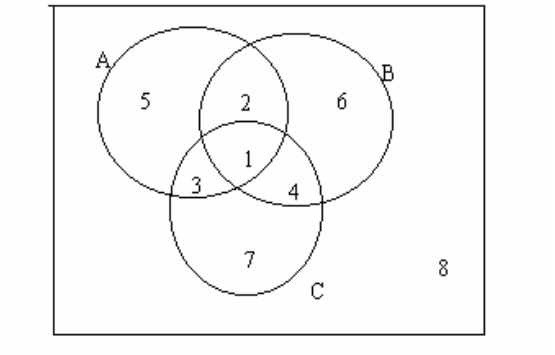
21. Suppose X, Y, and Z are sets in the universe $\boldsymbol{U}$

Draw a Venn Diagramme to illustrate $X \cap Y^C$

22. Suppose X, Y, and Z are sets in the universe $\boldsymbol{U}$

Draw a Venn Diagramme to illustrate $X \cap Y^C \cup Z$

For problems 23-25 *only*: Consider the following Venn Diagramme:



23. The regions corresponding to $1, 2, 3,$ and 5 symbolise: Answer 23:_____

A. $(A \cap B)^C \cup C$ B. $(A \cup B) \cap C^C$ C. $(A \cup B) \cap C$ D. $A \cup B$ E. $C \cap B$ F. $(A \cup B)^C \cap C$

G. None of these

24. The regions corresponding to $1, 3, 4, 5, 6, 7,$ and 8 symbolise: Answer 24:_____

A. $(A \cap B)^C \cup C$ B. $(A \cup B) \cap C^C$ C. $(A \cup B) \cap C$ D. $A \cup B$ E. $C \cap B$ F. $(A \cup B)^C \cap C$

G. None of these

25. $A \cup C$ corresponds to: Answer 25:_____

A. regions $1, 2, 3, 5$ B. regions $1, 2, 3, 4, 5, 7$ C. regions $2, 3, 4, 5, 6$ D. regions $6, 8$

E. regions $1, 2$ F. regions $1, 3$ G. regions $3, 5$ H. None of these

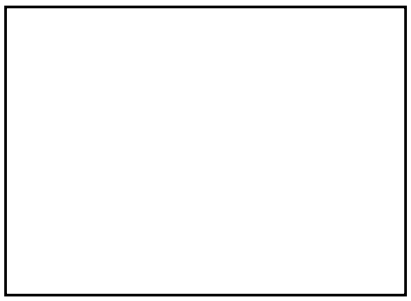
26. Draw Venn Diagrammes to illustrate if it is true or it is not true that:

Suppose X, Y, and Z are sets in the universe $\boldsymbol{U}$.

$(X^C \cap Y^C \cap Z)^C = X \cup Y^C \cup Z^C$

27. A survey was conducted of 650 All Souls Primary School Students with the following results: 90 had seen *Elf*, 151 had seen *Finding Nemo*, 163 had seen *Seabiscuit*, 17 had seen *Elf* and *Seabiscuit*, 70 had seen *Finding Nemo* & *Seabiscuit*, 43 had seen *Finding Nemo* & *Elf*, while 9 had seen all 3 movies.

a. Draw a Venn Diagramme to represent the survey results



Now, answer the following questions about the survey

b. How many All Souls Primary School students surveyed had not seen any of the 3 movies?

Answer (b):_____

c. How many All Souls Primary School students surveyed had seen *Finding Nemo* but not seen the other 2 movies?

Answer (c):_____

d. How many All Souls Primary School students surveyed had seen *Elf* and *Finding Nemo*, but not *Seabiscuit* ?

Answer (d):_____

e. How many All Souls Primary School students surveyed had seen *Elf* but not *Finding Nemo* nor *Seabiscuit*?

Answer (e):_____