Question 1: $If\ A = \{a, b, c, d, e\}$ $B = \{d, e, f\}$ $C = \{d, e\}$ $D = \{\#, \&, \$\}$,

a) *Fill in the blanks here, or put in the appropriate symbol* $\in, \subset, \approx$ *etc to make the association* **_most correct_**:
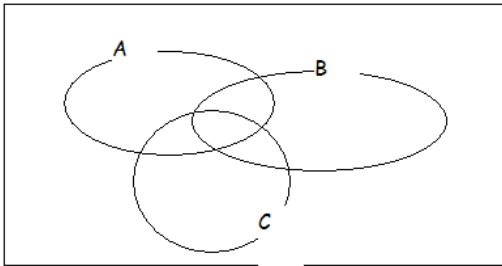
i) $\{e\}$ _____ B ii) $\varnothing$ _____ C iii) $\$$ _____ D iv) D _____ B

b) *Fill in the blanks*   i) $(A \cap \bar{B}) =$ _____   ii) $(B \cap \bar{C}) =$ _____   iii) $n((B \cup D) \cap \bar{A}) =$ ___
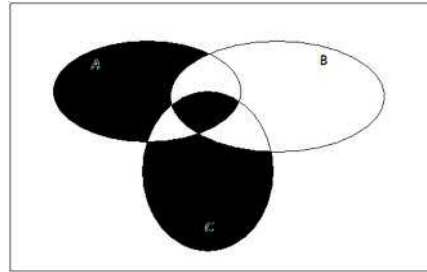
Don't forget the brackets

c) *write $C \times D$ being sure to use appropriate brackets and find $n(C \times D)$*

Question 2: *i) Shade in the region* $\{(A \cap B) \cap \bar{C}\} \cup \{\overline{A \cup B \cup C}\}$ *ii) write this in symbols* $\rightarrow$

Ques 3 Identify the following property for the general case of non zero whole numbers $a, b, c \in W$

a) $a \times 1 = a$ ....

b) $a(b + c) = a\,b + ac$ ....

c) $2 + (3 + 5) = (2 + 3) + 5$ ....

d) $a + 0 = a$ ....

e) $a\,b + ac = a(b + c)$ ....

Question 4: *Using the various properties Closure, Commutative etc. and Distributive, explain how you would compute the following, using quick and easy methods of association such as in 7+3 =10, 5*2=10 etc. and show the steps of your process.*

i) $77 + (89 + 23)$ ii) $25 \times (99 \times 4)$ iii) 124×5 *Hint: Use notion* $5 = \frac{10}{2}$

Question 5: i) *Using the relation* $\overline{A \cup B} = \bar{A} \cap \bar{B}$ *simplify* $\overline{A \cup (B \cap \bar{C})}$ *then using and* $\overline{A \cap B} = \bar{A} \cup \bar{B}$ *further transform the relation to one involving C*

Show at least 3 steps outline

*Question 6: Which of the following are **always true**, which **sometimes true** and which **definitely not true***

assume $a \neq 0, \neq 1$ $\dfrac{ab+c}{a} = b + c$ $\dfrac{ab+a}{a} = b + 1$ $\dfrac{ab+c}{ad+e} = \dfrac{b+c}{d+e}$

a, b, and c are Natural Numbers
& give Reasoning?

Question 7: In class, we learned several models for division of natural numbers, one model was the set model

another was the linear or measurement model, and yet another was the missing factor model, what was the

other model? Illustrate this last model in the case of $15 \div 5$

*Question 8: State the Division Algorithm exactly in its **pure and perfect form**, and illustrate this for the case*

where $a = 39$ and $b = 4$