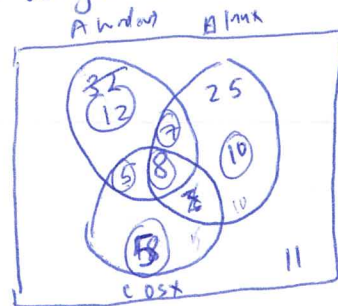


- (Q1) OS in 58 computers  
 32 windows (A)  
 25 linux (B)  
 18 OS X (C)  
 15 windows + linux (AB)  
 13 windows and OS X (AC)  
 8 all 3 operating systems

a. Venn diagram.



$$58 - 47 = 11$$

- (Q1) (1) 17  
 (2) 10  
 (3) 15  
 (4) 11  
 (5) 29

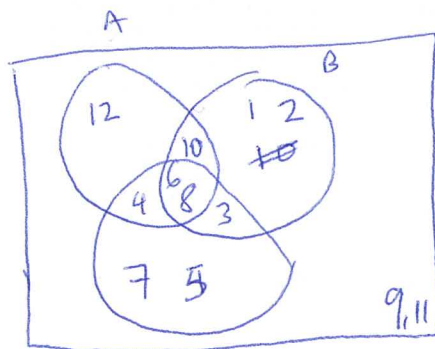
answer

$$32 + 5 \cdot (12 + 5 + 7 + 8) + (8 + 7 + (25 - x) + x) + (5 + 8 + 18 - x + x) = 58$$

2.  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$

$A = \{4, 6, 8, 10, 12\}$

(Q2)  $B = \{1, 2, 3, 6, 8, 10\}$   
 $C = \{3, 4, 5, 6, 7, 8\}$



(a)  $(\bar{A} \cup \bar{B}) \cap C$   
 $= \{7, 5, 6, 8, 3\}$

(b)  $(B \cap C) \cup A^c$   
 $= \{7, 5, 3, 1, 2, 9, 11\}$

3.  $f(x) = x^2 + 4x + 3$   $g(x) = 6x^2 + 3x - 4$   $h(x) = 7x + 8$

(Q3)

a.  $f(2) + g(3) = 74$

b.  $g(h(2))$

$f(2) = 2^2 + 4(2) + 3$

$f(2) = 4 + 8 + 3$

$f(2) = 15$

$g(3) = 6(3)^2 + 3(3) - 4$

$g(3) = 54 + 9 - 4$

$g(3) = 59$

$f(2) + g(3) = 15 + 59$   
 $= 74$

$h(2) = 7(2) + 8$

$h = 22$

$h(2) = 22$

$g(22) = 6(22)^2 + 3(22) - 4$

$g(22) = 6(22)^2 + 3(22) - 4$

$g(22) = 2664 + 66 - 4$

$g(22) = 2720$

$= 2720$

$3 \times 3 \times 3$

$9 \times 3$

18

9

27

$6 \times 9$

18

18

54

22

$\times \frac{22}{44}$

$6 \times \frac{22}{44}$

268 A

20

$\times 3$

60 - 4

2664

56

2720

(Q 4) Convert.

Base 2	Base 8	Base 10	Hex Base 16
$10^0 011010.101100$	$432.54_8$	$286.225_{10}$	$11A.B$
$1100100010010101010$	$3104532$	$101263$	$C895A$

4	3	2	5	4
421	421	421	421	421

$100 \quad 011 \quad 010.101 \quad 100$

base 8  $\rightarrow$  10 decimal change.

base 16  $\rightarrow$  2 split in 4.

$C895A$   
 $1289510$   
 $8421 \quad 8421 \quad 8421 \quad 8421 \quad 8421$   
 $1100 \quad 1000 \quad 1001 \quad 0101 \quad 1010$

$8^2 \quad 8^1 \quad 8^0 \quad 8^{-1} \quad 8^{-2}$   
 $432.54$

$432.54_8 \rightarrow 16$

$$432.54 \div 16 = (4 \times 64) (3 \times 8) (2 \times 0) + (5 \times \frac{1}{8}) + (4 \times \frac{1}{16})$$

(Q 5) a.  $AB + DC'$   
 b.  $(BC)A'$

$P \rightarrow R$  and  $not R \rightarrow P = Q$   
 $P \rightarrow Q$  and  $not Q \rightarrow P$

(Q 6) Binary tree  $2 \times 3 / (2-1) + 5 \times (4-1)$   
 $(\neg Q \rightarrow P) \wedge (T \vee P) =$

(Q 7) Truth table (a)

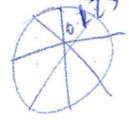
P	Q
T	T
T	F
F	T
F	F

P	Q	$(\neg Q \rightarrow P) \wedge (T \vee P)$
T	T	F
T	F	F
F	T	T
F	F	F

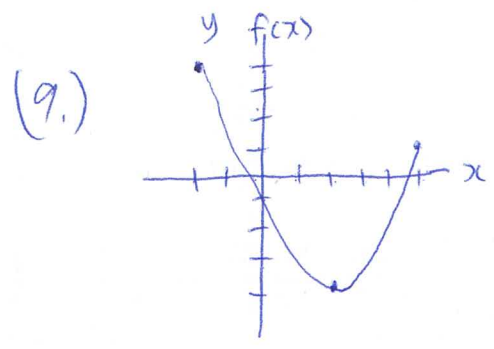
(b)  $\neg(\neg P \wedge Q) \vee P$   
 $P \wedge \neg P$   
 $\downarrow$   
 double negation law

P	Q	$\neg(\neg P \wedge Q) \vee P$	$(P \wedge Q) \vee P$
T	T	F	T
T	F	T	T
F	T	F	F
F	F	T	T

Associative law



(8.)  $\neg(p \vee (\neg p \wedge q)) \equiv \neg p \wedge \neg q$   
 $\downarrow$   
 $\neg(p \vee q) \equiv \neg p \wedge \neg q$  De Morgan's law  
 $\neg p \wedge \neg q \equiv \neg(p \vee (\neg p \wedge q))$



domain (x)  
range (y)

x	y
-2	4
2	-4
5	1

(10.) Find a minimal spanning tree Prim's and Kruskal's algorithm

$281.225_{10} \rightarrow 16$

$281.225 \div 16 = \underline{\hspace{2cm}}$

$101263 \div 8 = \underline{\hspace{2cm}}$

$$\begin{array}{r} 0.125 \\ \times 5 \\ \hline 0.625 \end{array}$$

$$\begin{array}{r} 0.4 \\ \times 4 \\ \hline 1.6 \end{array}$$

$$\begin{array}{r} 1.6 \\ + 0.625 \\ \hline 2.225 \end{array}$$

$$\begin{array}{r} 1 \\ \times 64 \\ \hline 64 \end{array}$$

$$\begin{array}{r} 1 \\ \times 4 \\ \hline 4 \end{array}$$

$$256 + 21 + 0 = \underline{\hspace{2cm}}$$

$\frac{1}{2} = 0.5$   
 $\frac{1}{4} = 0.25$   
 $\frac{1}{8} = 0.125$

$C895A =$

base 16  $\rightarrow$  base 10

$$\begin{array}{r} 1111 \\ 94730 \\ 6296 \\ 256 \\ 21 \\ 10 \\ \hline 101263 \end{array}$$

$$\begin{array}{r} 153 \\ \times 6296 \\ \hline 31770 \\ 6296 \\ \hline 94730 \end{array}$$

$$\begin{array}{r} 333 \\ 256 \\ \times 16 \\ \hline 1236 \\ 506 \\ \hline 6296 \end{array}$$

$$\begin{array}{r} 33 \\ 256 \\ \times 16 \\ \hline 1536 \\ 256 \\ \hline 2796 \end{array}$$

$16^4$	$16^3$	$16^2$	$16^1$	$16^0$
12	8	9	5	10
94730	6296	256	21	10

$$\begin{array}{r} 16 \\ 5 \\ \hline 21 \\ \times 16 \\ \hline 96 \\ 16 \\ \hline 256 \end{array}$$

$$\begin{array}{r} 2 \\ 18 \\ 18 \\ 18 \\ 54 \end{array}$$