1.a Calculate the decimal equivalent of the hexadecimal number $(A2F.D)_{16}$

1.b Working in base 2, compute the following binary additions, showing all you workings

$$(1110)_2 + (11011)_2 + (1101)_2$$

1.c Given x is the irrational positive number $\sqrt{2}$ :
(i) express $x^8$ in binary notation,
(ii) is $x^8$ a rational number?

1.d Express the recurring decimal $0.727272\ldots$ as a rational number in its simplest form.

2.a Describe the following set by the listing method

$$\{2r + 1 : r \in Z^{+} and r \leq 5\}$$

2.b Let A,B be subsets of the universal set U.

3.a Let n be an element of the set $\{10, 11, 12, 13, 14, 15, 16, 17, 18, 19\}$, and p and q be the propositions: p : n is even, $q : n > 15$. Draw up truth tables for the following statements and find the values of n for which they are true: (i) $p \vee \neg q$ (ii) $\neg p \wedge q$

4.a $\lfloor x - y \rfloor = \lfloor x \rfloor - \lfloor y \rfloor$

4.b

4.c

Let G be a simple graph with vertex set $V(G) = \{v1, v2, v3, v4, v5\}$ and adjacency lists as follows:

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v1 : v2 v3 v4
v2 : v1 v3 v4 v5
v3 : v1 v2 v4
v4 : v1 v2 v3.
v5 : v2
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5.a List the degree sequence of G. Draw the graph of G.

5.b Find two distinct paths of length 3, starting at v3 and ending at v4. Find a 4 cycle in G.

5.c Let G be a graph and let v be a vertex of G. Say what is meant by the degree of v. State, without proving, a result connecting the degrees of the vertices of a graph G with the number of its edges.

5.d Degree sequence 4,3,2,2,2 Degree sequence 4,3,3,2,2

5.e K8 has degree sequence 7,7,7,7,7,7,7,7 so every vertex has degree 7.