Test Your Understanding: Week 3

1. Describe the union, intersection, difference and complement of two sets *A* and *B* in words, ie define $A \cup B, A \cap B, A - B, \bar{A}$.

2. If the sets *U*={a,b,c,d,e,f,g,h}, *A*={a,c,d}, *B*={a,d,f,g} then find
(a) $A - B$
(b) $A \cup B$
(c) $A \cap B$

3. In the proof of Theorem 2.1.6, that if *A* has *n* members (|*A*|=*n*), then the power set of A has 2^n members, we encoded each subset of A by a bit string. If A={a,b,c,d,e }, use the scheme we used there to
(a) decode the following bitstrings into subsets
(i) 10010   (ii) 00110   (iii) 11100
(b) encode the following subsets into bitstrings
(i) {a,c,e}   (ii) {d,e}   (iii) {b,d}

4. Find a partition of the set {1, 2, 3, 4, 5} into 3 subsets.

5. Find the Cartesian product *X*×*Y* of the sets *X*={1,2}, *Y*={u,v}.

6. Complete the following table.

x	$\lfloor x \rfloor$	$\lceil x \rceil$
4.8		
17.999		
k+0.2		
x-0.2		
z+0.5		

Here *k*, *x* and *z* are integers.

7. Show that

(a) $\left\lfloor \dfrac{n}{2} \right\rfloor = \dfrac{n-1}{2}$ if *n* is odd.

(b) $\left\lceil \dfrac{n+1}{2} \right\rceil = \dfrac{n}{2} + 1$ if *n* is even.

(c) $\left\lceil \dfrac{n-1}{2} \right\rceil = \dfrac{n-1}{2}$, if *n* is odd.

Tessellation by Andrew Crompton.