**Problem 1:**

1. E(X) = (E(x1) + E(x2) + … + E(xi) + … + E(xn)) for all xi tosses

For any toss, xi, E(xi) = 1/9 + 2/3 + 3/9 + 4/6 + 5/9 + 6/6 = 10/3

So, E(X) = n\*10/3 = **10n/3**

1. E(X) = n \* (probability the dice is even)

= n \* (1/3 + 1/6 + 1/6) = n \* 2/3

= **2n/3**

**Problem 2:**

For each j, where j is an element of 1 … n, there are n possible values for f(j), and each is equally likely (since it is uniform). Thus. P(f(j) = i) = 1/n for any j, i elements of S

For each i, P(i has one inverse with respect to f) = P(f(j) = i) \*  ∏P(k != i) for any k element of S-j

P(k != i) = 1 – P(k = i) = (n-1)/n

So, for each I, P(I has one inverse with respect to f) = 1/n \* ((n-1)/n)n

E(|U|) = n \* (1/n \* ((n-1)/n)n) = **((n-1)/n)n**

For each j, where j is an element of 1 … n, there are n possible values for f(j), and each is equally likely (since it is uniform). Thus. P(f(j) = j) = 1/n

E(|V|) = n \* (1 \* (1/n)) = n/n = **1**

**Problem 3:**

Text

**Problem 4:**

Text

**Problem 5:**

Text