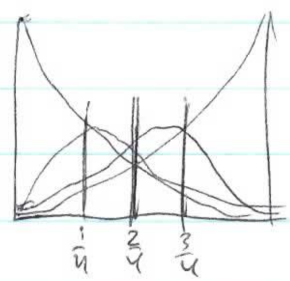
Kha Le

1.

Value i of X	Associated Sample Points	Prob $(X=i)$
0	(T,T,T)	$(1-p)^3$
1	(H,T,T), (T,H,T), (T,T,H)	$3(p)(1-p)^2$
2	(H,H,T), (H,T,H), (T,H,H)	$3(p)^2(1-p)$
3	(H,H,H)	p^3

- $(1-p)^3 + 3(p)(1-p)^2 + 3(p^2)(1-p) + p^3$
$= 1-3p+3p^2-p^3+3p-6p^2+3p^3+3p^2-3p^3+p^3$
$= 1$

- p must be in between $\frac{1}{2}$ and $\frac{3}{4}$



2. $E(X) = \sum_{i=0}^{n} i \cdot C(n,i) p^i q^{n-i}$

$= \sum_{i=1}^{n} i \cdot C(n,i) p^i q^{n-i} = \sum_{i=1}^{n} (n \cdot C(n-1,i-1)) p^i q^{n-i}$

$= np \sum_{i=1}^{n} C(n-1,i-1) p^{i-1} q^{n-i}$

$= np \sum_{j=0}^{n-1} C(n-1,j) p^j q^{n-1-j}$, where $j=i-1$

$= np(p+q)^{n-1} = \boxed{np}$

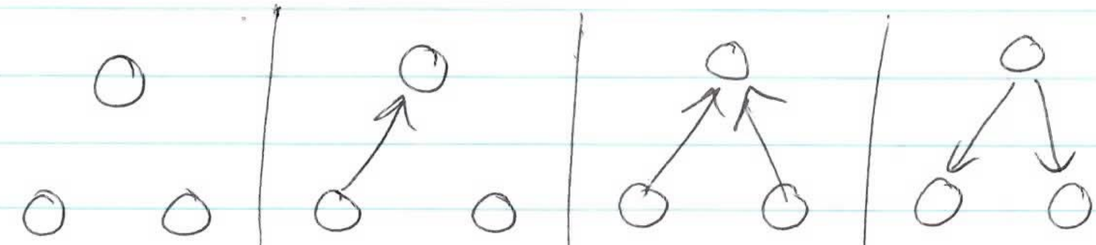
3.

#(H)	Prob	Total net gain	Contribution to expected net gain	expected net gain
0	$(\frac{1}{3})^3 = \frac{1}{27}$	-3	$-3(\frac{1}{27}) = -\frac{1}{9}$	$-\frac{1}{9}+0+\frac{4}{9}+\frac{16}{9}$
1	$(\frac{2}{3})(\frac{1}{3})^2 = \frac{2}{27}$	0	$0(\frac{2}{27}) = 0$	
2	$(\frac{2}{3})^2(\frac{1}{3}) = \frac{4}{27}$	3	$3(\frac{4}{27}) = \frac{4}{9}$	$= \boxed{\frac{19}{9}}$
3	$(\frac{2}{3})^3 = \frac{8}{27}$	6	$6(\frac{8}{27}) = \frac{16}{9}$	

4. certain; uncertainties
example: $E(X+Y) = E(X) + E(Y)$

5. - If R is a linear order, each row in R should have a distinct # of 1's from $\{1, 2, \dots, n\}$ where n is the # of rows.
- The rows with the smallest # of 1's correspond to maximal items.

6.



#(partial orders) = 1 | 6 | 3 | 3

~~7. If the relation contains no symmetric relations. In other words, for every (x,y) relation, exactly one~~ (x,y) that exist
or

7. A relation is anti-symmetric if it contains no symmetric relations. In other words, if two items x, y have a relation, exactly one of (x, y) or (y, x) exist.

8. Equivalence relations are symmetric while partial orders are not.