**Q1)**

**a)**

P(S=3|D2)\*P(D2) / P(S=3) = ?

P(S=3) = P(S=3|D1)\*P(D1) + P(S=3|D2)\*P(D2) + P(S=3|D3)\*P(D3)

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

= 169/(12^3)

P(S=3|D2)\*P(D2) = 2\*((1/6)^2)\*((1/2)^2) = 1/72

* ? = 24 / 169

**b)**

P(S=5|D2)\*P(D2) + P(S=5|D4)\*P(D4) / P(S=5) = ?

P(S = 5) = P(S=5|D1)\*P(D1) + P(S=5|D2)\*P(D2) + P(S=5|D3)\*P(D3) + P(S=5|D4)\*P(D4) + P(S=5|D2)\*P(D2)

= 1/12 + (1/72) + (1/(72\*6)) + (1/(72\*72)) + (1/(72\*72\*96))

P(S=5|D2)\*P(D2) + P(S=5|D4)\*P(D4) = (1/72) +(1/(72\*72))

* ? = 7008 / 49633

**c)**

P(S=5|D2|Dice1 = 2)\*P(D2) / P(S = 5) = ?

P(S = 5) = P(S=5|D1)\*P(D1) + P(S=5|D2)\*P(D2) + P(S=5|D3)\*P(D3) + P(S=5|D4)\*P(D4) + P(S=5|D2)\*P(D2)

= 1/12 + (1/72) + (1/(72\*6)) + (1/(72\*72)) + (1/(72\*72\*96))

P(S=5|D2|Dice1 = 2)\*P(D2) = 1/144

* ? = 3456 / 49633

**d)**

**Q2)**

**1)**

**2)**

F(a) = f(0) + f(1) + … + f(a)

P(a < x < b) = F(b) – F(a)

**a)**

P(X = 0) = P(0 <= x <= 0) = F(0) – F(0) = 0

**b)**

P(0 < x < 2) = F(2) – F(0)

F(2) = 1, F(0) = 20/56 => P = 36 / 56

**Q3)**

[-∞, +∞]∫ f(x)dx = 1 and [a, b]∫f(x)dx = P(a < x < b)

**a)**

[1, +∞]∫ f(x)dx = [-c\*(x^-4)/4] [1, +∞] = 1

* c = 4

**b)**

F(x) = [1, +∞]∫ x\*f(x)dx = [-c\*(x^-3)/3] [1, +∞]

* F(x) = { 0, x < 1

= {-c/(3\*x^3), x>= 1

**c)**

P(x>2) = F(+∞) – F(2)

= 0 – (-c/24) = c/24

**Q4)**

**a)**

g(x) = [0,1] ∫(x-y)dy = [xy – y^2/2][0,1] => g(x) = x – ½

h(y) = [2,1] ∫(x-y)dx = (x^2/2 - xy)[2,1] => h(y) = 3/2 – y

**b)**

f(x,y) =? g(x)\*h(y) => x-y ≠ (x – ½)\*( 3/2 – y)

* f(x,y) ≠ g(x)\*h(y) => it is not independent !!!

**c)**

f(x|y) = f(x,y) /h(y) = (x-y) / (3/2 - y)

P(x > 1.5|y = 0.5) = [1.5 , 2] ∫ (x-y) / (3/2 - y) dx

= [1.5 , 2] ∫ (x-0.5) / (3/2 – 0.5) dx = [(x^2/2) – (x/2)][1.5, 2]

* P = 5/8