Assignment - 4

4.30

$$P(X > t+s \mid X > t)$$

$$= \frac{P(X > t+s)}{P(X > t)} = \frac{e^{-(t+s)/\beta}}{e^{-t/\beta}} = e^{-s/\beta}$$

$$= P(X > s)$$

$\boxed{\text{Proved}}$

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4.31

$$P(X \geq t+s \mid X \geq t)$$

$$= \frac{P(X \geq t+s)}{P(X \geq t)}$$

$$= \frac{(1-p)^{t+s}}{(1-p)^{t}}$$

$$= (1-p)^{s}$$

$$= P(X \geq s)$$

4.32

~~(a) It is distributed as geometric distribution.~~

~~$p = \frac{1}{K}$~~

~~Expe~~

4.32

(a) $E(N) = 1 \times \frac{1}{K} + 2 \cdot \frac{K-1}{K} \times \frac{1}{K-1} + 3 \times \frac{K-1}{K} \times \frac{K-2}{K-1} \times \frac{1}{K-2} + \dots$

$$= \frac{1}{K} \sum_{i=1}^{K} i$$

$$= \frac{1}{K} \frac{K(K+1)}{2}$$

$$= \frac{K+1}{2}$$

(b) It is distributed as geometric with success probability, $p = \frac{1}{K}$

So, $E[\text{trial count}] = E[\text{failure count}] + 1$

$$= \frac{1-p}{p} + 1$$

$$= \frac{1-p+p}{p}$$

$$= \frac{1}{p} = K$$

2

$$f(x,y) = \frac{1}{\text{Area}}$$

$$= \frac{1}{mn}$$

3

i) $f(x,y)$

~~x, y are ind~~

$$f(x,y) = \frac{1}{\text{Area}} = \frac{1}{\pi R^2}$$ where R is circle radius

ii) ~~$f(r,\theta)$~~

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r, θ is chosen independently

so,

$$f(r) = U(0, R)$$

$$= \frac{1}{R}$$

$$f(\theta) = U(0, 2\pi)$$

$$= \frac{1}{2\pi}$$

so, $f(r,\theta) = \frac{1}{2\pi R}$ while R is circle radius.