#12 (a) Section 4.7

$$P(X \geq 15) = 1 - F(15) = 0.4346$$

$$P(X = 0) = p\left(0; \tfrac{1}{18}(15)\right) \overset{\text{Excel}}{=} \text{prissondist}\left(0, \tfrac{15}{18}, 0\right)$$

λt

$\beta = 18 \frac{\text{min}}{\text{car}} \longleftrightarrow \frac{1}{18} \frac{\text{cars}}{\text{min}}$

$\lambda = \frac{1}{18}$

#12(b)

$$P(30 \leq X \leq 50) = F(50) - F(30)$$

$$= 0.1851$$

$$F(x) = 1 - e^{-\frac{x}{\beta}}$$

$$= \left(1 - e^{-\frac{50}{43}}\right) - \left(1 - e^{-\frac{30}{43}}\right)$$

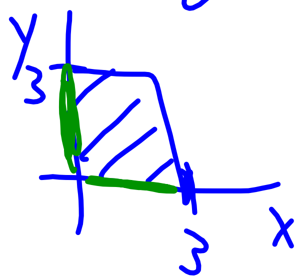
$$F(a) - F(b) = e^{-\frac{b}{\beta}} - e^{-\frac{a}{\beta}}$$

$$= e^{-\frac{30}{43}} - e^{-\frac{50}{43}}$$

$$f(x,y) = \begin{cases} C(2x+y) & \text{if } (x,y) \in [0,3] \times [0,3] \\ 0 & \text{otherwise} \end{cases}$$

"in"

$$\mathrm{Ran}(X) \times \mathrm{Ran}(Y)$$



$$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} f(x,y)\,dx\,dy = C\int_{y=0}^{3}\int_{x=0}^{3}(2x+y)\,dx\,dy$$

$$= C\int_{y=0}^{3}\left[x^2+xy\right]_{x=0}^{3} dy$$

$$= C\int_{0}^{3}(3y+9)\,dy$$

$$\frac{27}{2}+\frac{\cancel{27}^{\,54}}{2}$$

$$= C\left[\frac{3}{2}y^2+9y\right]_{0}^{3}$$

$$\frac{81}{2}$$

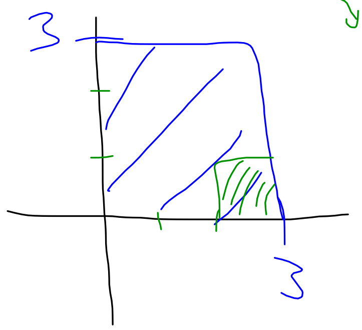
$$= \frac{81}{2}C = 1 \Longrightarrow C = \frac{2}{81}$$

$$f(x,y) = \begin{cases} \frac{2}{81}(2x+y) & \text{if } (x,y) \in [0,3] \times [0,3] \\ 0 & \text{otherwise} \end{cases}$$

"in"

$$P(X \geq 2, Y \leq 1) = \int_{y=0}^{1} \int_{x=2}^{3} \frac{2}{81}(2x+y)\,dx\,dy$$

and

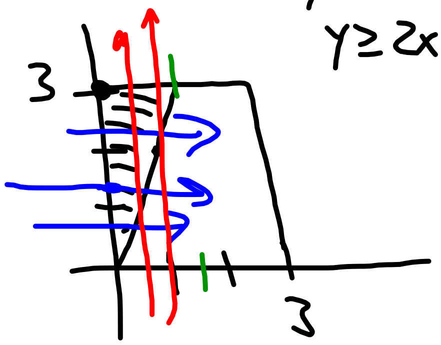


$$= \int_{2}^{3} \int_{0}^{1} \frac{2}{81}(2x+y)\,dy\,dx$$

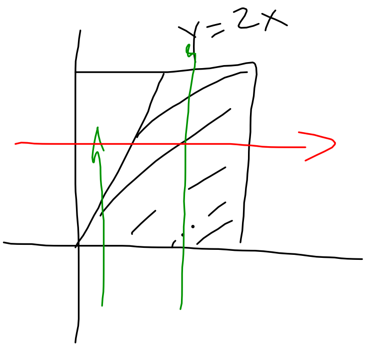
$$P(2X \le Y) = \int_0^3 \int_{x=0}^{x=\frac{1}{2}y} f(x,y)\,dx\,dy$$

$y = 2x$

$y \ge 2x$



$$= \int_0^{\frac{3}{2}} \int_{y=2x}^{3} f(x,y)\,dy\,dx$$



$$\int_{x=0}^{3} \qquad dy\,dx$$

$$\int_{0}^{3}\int^{3} \qquad dx\,dy$$