3. area of a triangle = (height * base)/2
= (height * 1)/2 base = 1
= height/2

a) max height = 1
max area = 1/2

height/2 ≤ 1/4
height ≤ 1/2
for A ≤ 1/4, {(x,y)| 2 ≤ x ≤ 3, 1 ≤ y ≤ 1.5 }

b) All triangle heights from 0 to 1 are possible. Since the point is arbitrarily chosen (all points equally probable), all areas from 0 to 1/2 are equally probable.

$$F(x) = \begin{cases} 0 & \text{for } x < 0 \\ 2x & \text{for } 0 \le x \le 1/2 \\ 1 & \text{for } x > 1/2 \end{cases}$$

c) f(x) = d/dx F(x)

$$f(x) = \begin{cases} 0 & \text{for } x < 0 \\ 2 & \text{for } 0 \le x \le 1/2 \\ 0 & \text{for } x > 1/2 \end{cases}$$

4. Exp(3)

$F(a) = 1 - e^{-\lambda a}$

$= 1 - e^{-3a}$

$0.5 = 1 - e^{-3a}$

$-0.5 = -e^{-3a}$

$0.5 = e^{-3a}$

$\ln(0.5) = \ln(e^{-3a})$

$\ln(0.5) = -3a$

$a = \ln(0.5)/-3$

$a = 0.2310$

The median of an Exp(3) distribution is 0.2310.

5. Par(1)

$F(x) = 1 - 1/x^{\alpha}$

$= 1 - 1/x^{1} = 1 - 1/x$

$0.5 = 1 - 1/x$

$-0.5 = -1/x$

$0.5 = 1/x$

$0.5x = 1$

$x = 2$

The median of a Par(1) distribution is 2.