

### Question 13

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in this margin

The discrete random variable  $X$  represents the number of throws of a fair die up to and including the first 6. What probability distribution is an appropriate model for  $X$ ? Find the mean and variance of  $X$ .

[3]

Geometric

$$P_X(n) = \left(\frac{5}{6}\right)^{n-1} \frac{1}{6}$$

$$\text{mean} = 1/\frac{1}{6} = 6$$

$$\text{variance} = 9/p^2 = \left(\frac{5/6}{1/6}\right)^2 = 30$$

### Question 14

What is the median of the triangular distribution with parameter  $\theta = 2$ ?

[4]

$$F(w) = 1 - \left(\frac{1-w}{\theta}\right)^2$$

$$0.5 = 1 - \left(\frac{1-w}{\theta}\right)^2$$

$$\left(\frac{1-w}{\theta}\right)^2 = 0.5$$

$$1 - \frac{w}{\theta} = \frac{1}{\sqrt{2}}$$

$$\frac{w}{\theta} = 1 - \frac{1}{\sqrt{2}} = \frac{\sqrt{2}-1}{\sqrt{2}} \Rightarrow w = \theta \left(\frac{\sqrt{2}-1}{\sqrt{2}}\right) = 2 - \sqrt{2}$$