

"success", where  $P(\text{success})$  for each trial is  $p$ .

$$E(X) = \cancel{P(X=1)} \cdot 1 + \cancel{P(X=2)} \cdot 2 + \cancel{P(X=3)} \cdot 3 + \dots$$

$\overset{p}{\cancel{P(X=1)}}$        $\overset{(1-p) \cdot p}{\cancel{P(X=2)}}$        $\overset{(1-p)^2 \cdot p}{\cancel{P(X=3)}}$

$$E(X) = 1p + 2p(1-p) + 3p(1-p)^2 + \dots$$

$$\underline{(1-p)E(X)} = \underbrace{1p(1-p) + 2p(1-p)^2 + \dots}$$

$$E(X) + \underset{(p-1)}{\cancel{(1-p)}E(X)} = 1p + 1p(1-p) + 1p(1-p)^2 + \dots$$

$$\cancel{E(X)} + pE(X) - \cancel{E(X)} = p + p(1-p) + p(1-p)^2 \bullet$$

$$E(X) + p E(X) - \overset{(p-1)}{E(X)} = p + p(1-p) + p(1-p)^2 + \dots$$

$$E(X) = 1 + (1-p) + (1-p)^2 + \dots = \frac{1}{1-(1-p)}$$

$$\frac{1}{1-(1-p)} = \boxed{\frac{1}{p}}$$