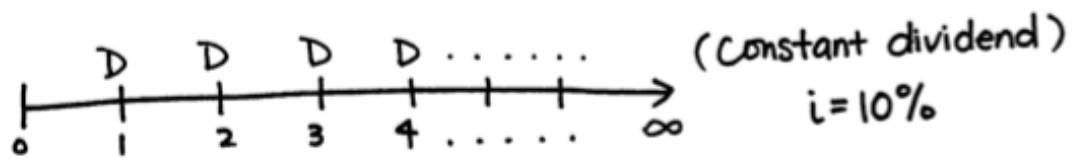


FM #36



$$\text{Duration} = \frac{\sum_{t=1}^{\infty} t \cdot v^t \cdot C_t}{\sum_{t=1}^{\infty} v^t \cdot C_t} = \frac{\sum_{t=1}^{\infty} t \cdot v^t \cdot D}{\sum_{t=1}^{\infty} v^t \cdot D} = \frac{D \cdot \sum_{t=1}^{\infty} t \cdot v^t}{D \cdot \sum_{t=1}^{\infty} v^t} = \frac{\sum_{t=1}^{\infty} t \cdot v^t}{\sum_{t=1}^{\infty} v^t}$$

Denominator:  $\sum_{t=1}^{\infty} v^t = a_{\infty|i} = \$1$  Present value of Perpetuity immediate =  $\frac{1}{i}$

Numerator:  $\sum_{t=1}^{\infty} t \cdot v^t = (Ia)_{\infty|i} =$  Present Value of Increasing perpetuity immediate beginning with \$1 and increasing by \$1 each period.

$$= \frac{1+i}{i^2} \text{ or } \frac{1}{i} + \frac{1}{i^2}$$

$$\text{Duration} = \frac{\frac{1+i}{i^2}}{\frac{1}{i}} = \frac{\frac{1.1}{.1^2}}{\frac{1}{.1}} = \frac{110}{10} = 11 \text{ (C)}$$