

Question #169

For 3-Year Endowment  $A_{x:\overline{3}|}$

$$b = 1000$$

$$i = .05$$

$$P_x = P_{x+1} = .7$$

Find  ${}_2V_x$

$$({}_hV_x + \pi_h)(1+i) = b_{x+h} q_x + {}_{h+1}V_x P_x$$

$$\ddot{a}_{x:\overline{3}|} = \sum_{k=0}^2 v^k {}_kP_x = 1 + .7v + .7^2 v^2 \approx 2.1111$$

$$A_{x:\overline{3}|} = vq_x + v^2 P_x q_{x+1} + v^3 P_x P_{x+1}$$

$$= .3v + (.3)(.7)v^2 + .7^2 v^3 \approx .8994708$$

$$\pi = \frac{b A_{x:\overline{3}|}}{\ddot{a}_{x:\overline{3}|}} = \frac{(1000)(.8994708)}{2.1111} \approx 426.0652$$

Since it is an endowment, the right side of the equation becomes  $b, 1000$ .

$$({}_2V_x + 426.0652)(1.05) = 1000 q_{x+2} + 1000 P_{x+2}$$

$${}_2V_x + 426.0652 = \frac{1000}{1.05} (q_{x+2} + P_{x+2}) = \frac{1000}{1.05} (1)$$

$${}_2V_x = 952.3810 - 426.0652$$

$${}_2V_x \approx 526.3158 \approx 526 \quad \boxed{A}$$