Question 3 :(7 Points)

a. **Find the present value of an annuity of $250 due at the beginning of each year for three years, and $550 due thereafter at the beginning of each year for four years. If the interest rate is 5% compounded annually?(3 points)**

Solution: Method 1: $r = .05$

0	1	2	3	4	5	6	7
250	250	250	550	550	550	550	

The present values of all payments $= 250(1.05)^0 + 250(1.05)^{-1} + 250(1.05)^{-2} + 550(1.05)^{-3} + 550(1.05)^{-4} + 550(1.05)^{-5} + 550(1.05)^{-6}$ 2

$= 250 + 238.095 + 226.757$

$= \$2483.81$ 1

—《 OR 》—

Method 2:

The present values of all payments $= 550(1 + a_{\overline{7-1}|.05}) - 300(1 + a_{\overline{3-1}|.05})$ 1

$= 550(1 + a_{\overline{6}|.05}) - 300(1 + a_{\overline{2}|.05})$

$\simeq 550(1 + 5.075692) - 300(1 + 1.859414)$ 1

$\simeq \$ 2483.81$ 1

b. **In 12 years a *$42,000* bus will have a salvage value *20%* of its cost. A new bus at that time is expected to sell for *$48,000*. In order to provide funds for the difference between the replacement cost and the salvage value, a sinking fund is setup into which equal payments are placed at the end of each year. If the fund earns *6%* compounded annually, how much should each payment be? (4 points)**

Solution: Time $= n = 12$, $r = .06$, $R = ?$

Salvage Value $= (0.20)(42000) = \$ 8,400$ 1

The amount needed after 12 years $= 48000 - 8400$

$= 39,600 = S$ 1

$S = R \cdot s_{\overline{n}|r} \Rightarrow R = \dfrac{S}{s_{\overline{n}|r}} = \dfrac{39600}{s_{\overline{12}|.06}}$ 1

$\approx \dfrac{39600}{16.869941} = \$ 2,347.37$ 1

—《 OR 》—

$R = \dfrac{S}{s_{\overline{n}|r}}$ where $s_{\overline{n}|r} = \dfrac{(1+r)^n - 1}{r} = \dfrac{(1.06)^{12} - 1}{.06}$

$= 16.869942$

$\therefore R = \dfrac{39,600}{16.869942} = \$ 2347.37.$