

**Capital Value** of a continuous income stream is simply the present value on the interval  $[0, \infty)$ , that is Capital Value =  $\int_0^{\infty} f(t)e^{-rt} dt$  where  $f(t)$  is the rate of income flow function, and  $r$  is the annual interest rate compounded continuously. In other words, capital value gives the worth of an investment that generates income forever.

**Examples:**

a) Neal has created a new computer game. He decides to lease the rights to his computer game to GameStop for an indefinite annual payment of \$15,000. Determine the capital value of this lease at an annual interest rate of 7.5% compounded continuously.

b) You wish to leave a scholarship at SAC for future business majors in your name. If the scholarship is to be for \$1500 annually, and the interest rate is 6.25% compounded continuously, what does your initial investment need to be to fund the scholarship indefinitely?

**Homework Problems:**

1) B.K. O'Neal just discovered oil on some newly inherited land. He decides to lease the oil rights to Exxon Oil for an indefinite annual payment of \$50,000. Determine the Capital value of this lease at an annual interest rate of 8% compounded continuously.

2) Maria Lopez, a wealthy alumna of Old State University, wants to establish a scholarship in her name for business students. If the annual scholarship is to be \$10,000, how much does Maria need to fund this scholarship if the annual interest rate is 6% compounded continuously?

3) Elle owns a rental property that generates an indefinite annual rent of \$12,000. Determine the capital value of this property at an annual interest rate of 5.5% compounded continuously.

4) If the annual proceeds from the Emma Lou Smith scholarship fund will be \$8000 indefinitely and the annual interest rate is 7.5% compounded continuously, how much should be invested to fund this scholarship?

**Answers:**

1) Capital value = \$625,000

2) Maria needs to donate \$166,666.67 to fund her scholarship indefinitely

3) Capital value is about \$218,182

4) About \$106,667