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