Day 42 is Thursday, December 6th, 2012

Continuing Section 7-2

Drawing for example at end of lecture Tuesday

Continuous Income Stream with flow rate

$$f(t) = 600\, e^{(.06t)}$$

(A) Find total income in 1st two years

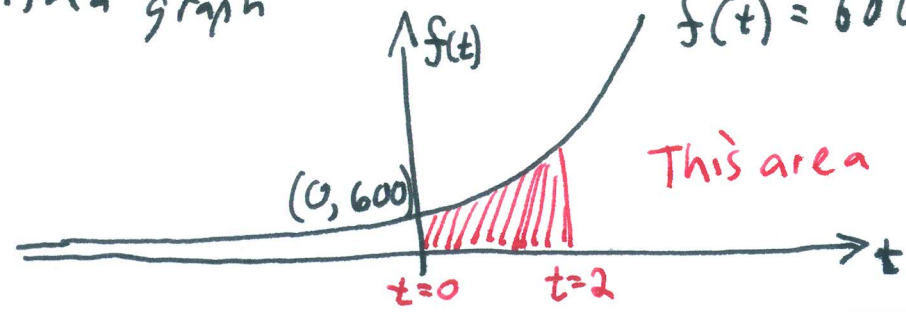
Solution (from Tuesday)

$$\Delta F = F(2) - F(0) = \int_{x=0}^{x=2} f(t)\,dt = \int_{x=0}^{x=2} 600\, e^{(.06t)}\,dt$$

$$= 10{,}000\left(e^{.12} - 1\right) \quad \text{from Tuesday}$$

$$\approx \$1274.97$$

(B) Illustrate with a graph



"Future Value Problems"

Given info about starting balance
and income stream flow rate

and interest rate

Find: the future value of the account
(the balance at some time in future.)

The two "Total Change" problems that we studied on Tuesday could be thought of as simple future value problems.

- zero intial balance
- known flow rate
- accumulated money is not earning any interest.

More difficult Future Value Problems

- may or may not have initial balance
- known & income stream flow rate $f(t)$
- accumulated money is going to be earning interest. (Continuously compounded interest e^{rt}).

Formula for Future Value of a Continuous Income Stream

$$FV = \int_{t=0}^{t=T} f(t)e^{r(T-t)}dt = \int_{t=0}^{t=T} f(t)\,e^{rT}e^{-rt}dt = e^{rT}\int_{t=0}^{t=T} f(t)e^{-rt}dt$$

$e^{a+b} = e^a e^b$

t is time in years (a variable)

T is the future time (in years) when you want to know what the value will be. (T is a constant)