Math 211-2015S-W12-~~Tues~~ Wed

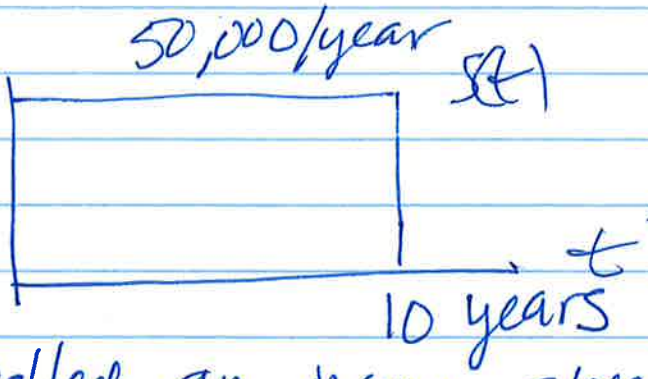
Present and future value: Income Streams

Remember $B = Pe^{rt}$ future value B of payment P today

$P = Be^{-rt}$ present value P of payment B expected in future

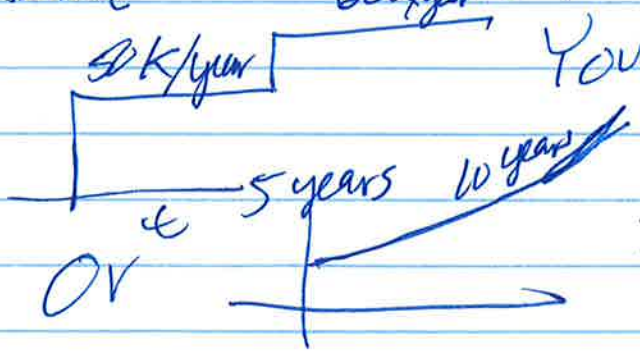
What if instead of a single payment at one moment in time you get continuous payments spread out over a longer period of time

Salary $/year



this is called an income stream

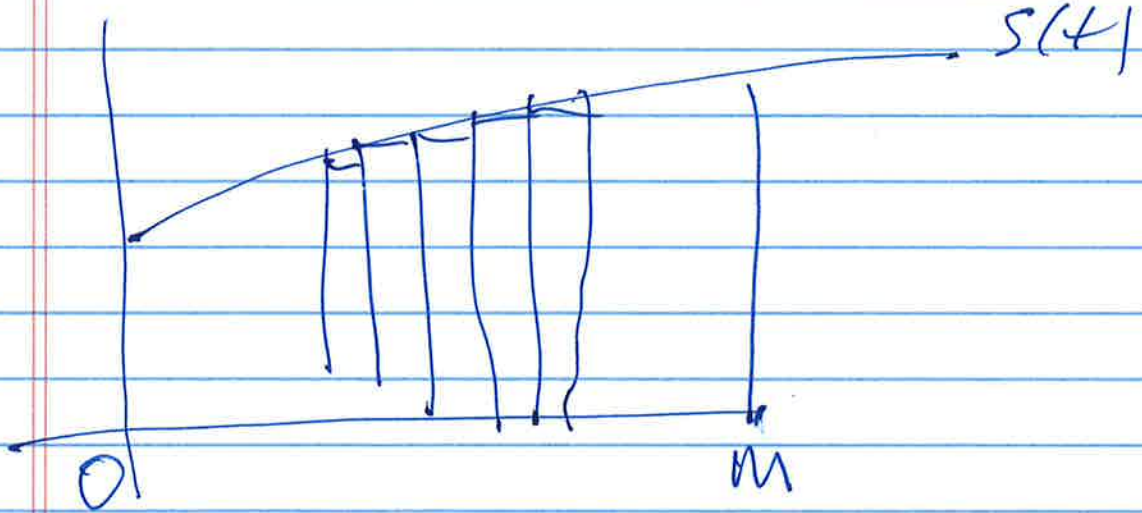
You might not have ~~Continuous~~ constant Streams



You might get raises

$S(t) = (50 + t)$ thousand $/year

The present value of an income stream is the amount you would have to deposit today in an interest bearing account to have the same amount of money you would get from income stream at some later date M (assuming the money from the stream was also deposited as it came in)



Divided interval into rectangles
Find present value of each
Sum them up
turn sum into integral

$$P = Be^{-rt} \longrightarrow P = \int_0^M S(t)\, e^{-rt}\, dt$$

Once you have present value you can easily find future value

Future value: use $B = Pe^{rt}$

on calculated P use $t = M$

$$B = Pe^{rM}$$

you don't need another integral

Example: Find present and future values of a constant income stream of $1000 per year over a period of 20 years

$S(t) = 1000 \quad r = 0.06$

$$PV = \int_0^{20} 1000 e^{-0.06t} \, dt$$

$$= \frac{1000}{-0.06} \left[e^{-0.06t} \Big|_0^{20} \right]$$

$$= \frac{1000}{-0.06} \left(e^{-0.06 \cdot 20} - e^0 \right)$$

$$= \$11,647$$

$$FV = 11,647 e^{0.06(20)} = 38,669$$