

T = # (time)  
 t = variable (dt)  
 ↳ can't pull t outside

$$\frac{F(t_i) - F(t_{i-1})}{\Delta t} \cdot \Delta t, \quad \Delta t = \frac{T}{N}$$

For large N,  $\approx f(t_i) \Delta t$  = total f  
 rate · time

So, the FV @  $t = T$  is  $f(t_i) e^{-(T-t_i)} \Delta t$  (from  $F = Pert$ )  
 part of principal

T t<sub>i</sub>  
 ↓ ↓  
 $e^{10-11} > e^{10-9}$

→ Now,  $\sum_{i=1}^N f(t_i) e^{-(T-t_i)} \Delta T$ , Take  $\lim_{N \rightarrow \infty} \sum = \int_0^T f(t) e^{-(T-t)} dt$

$$= \int_0^T f(t) e^{-r(T-t)} dt \quad * \text{Never bring variables outside the integral, only constants} *$$

$$FV = F(T) = e^{-rT} \int_0^T f(t) e^{rt} dt \quad \left. \begin{array}{l} \text{future value development} \\ \text{interest builder} \end{array} \right\}$$

T: time of investment, business duration

r: rate of interest you are saving/investing on it comes in.

given -  $f(t)$ : rate @ which \$ enters continuously into your acct.

$$\int_0^T f(t) e^{-rt} dt = \text{PV aspect of FV formula}$$

\* Know Integration by Parts for  $f(t)$

"What should I see in my business for?"

ie what is its PV or "fair market share"

Example: (If continuous, use ch 35, not ch 5)

Acct is set up so \$2,000 flows continuously into it

Interest is compounded @ rate of 10%. How much money will be in the acct @ the end of 6 years

↳ T = 6 years,  $r = .1$ ,  $f(t) = 2,000$   
 ↳  $F(T) = ?$

$$* \int e^{at} dt = \frac{e^{at}}{a} + C \quad \rightarrow$$