Guided Notes: Compound Interest

Compounded over time period:

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

Compounded continuously:

$$A = P e^{rt}$$

A: Amount Received (end)

P: Principal (start)

r: Rate - always as a decimal

n: Number of times interest is compounded

t: Time

Compounded.....	n =
yearly, annually	1
semiannually	2
quarterly	4
monthly	12

EX1. What amount will an account have after 5 years if $75 is invested at 8.5% interest compounded continuously?

$A = Pe^{rt}$

$A = ??$

$P = 75$

$r = 8.5\% \rightarrow 0.085$

$t = 5$

$A = 75e^{0.085(5)}$

$A = \$114.72$

EX2. Find the amount owed at the end of 9 years if $5000 is loaned at a rate of 6% interest compounded quarterly.

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

$A = ??$

$P = 5000$

$r = 0.06$

$n = 4$

$t = 9$

$$A = 5000\left(1 + \frac{0.06}{4}\right)^{4(9)}$$

$$A = \$8545.70$$

EX3. Determine the amount that must be invested at 6% interest compounded monthly, so that $200,000 will be available for retirement in 20 years.

EX4. What amount invested at 7% interest compounded continuously for 4 years will yield $700?

EX5. If $600 is invested at 6% interest compounded continuously, how long will it take before the amount is $900?

$A = Pe^{rt}$

$A = 900$

$P = 600$

$r = 0.06$

$t = ??$

$$\frac{900}{600} = \frac{600e^{0.06t}}{600}$$

$$1.5 = e^{0.06t}$$

$$\frac{\ln 1.5}{0.06} = \frac{0.06t}{0.06}$$

$$t = 6.76 \text{ years}$$

EX6. How long does it take $1500 to double if it is invested at 6% interest compounded semiannually?

$A = P\left(1 + \frac{r}{n}\right)^{nt}$

$A = 3000$

$P = 1500$

$r = 0.06$

$n = 2$

$t = ??$

$\frac{3000}{1500} = \frac{1500\left(1 + \frac{0.06}{2}\right)^{2t}}{1500}$

$2 = \left(1 + \frac{0.06}{2}\right)^{2t}$

$2 = 1.03^{2t}$

$t = 11.72$ years

Homework is Page 2.7 in Packet