GUIDED NOTES: Compound Interest

Compounded over time period: $A = P\left(1 + \frac{r}{n}\right)^{nt}$

Compounded continuously: $A = Pe^{rt}$

A: amount at end

P: Principal amount (start)

r: rate (decimal)

n: number of times compounded

t: time

Compounded.....	n =
yearly	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?

t .085

$A = Pe^{rt}$ P r

$A = 75e^{.085(5)}$

$A = \$114.72$

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

t P r=.06 n

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

$A = 5000\left(1 + \frac{.06}{4}\right)^{4(9)}$

$A = \$8545.70$

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. t .06 n=12 A

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

$\frac{200{,}000}{3.3\ldots} = \frac{P\left(1 + \frac{.06}{12}\right)^{12(20)}}{3.3\ldots}$

$P = \$60{,}419.23$

EX4. What amount invested at 7% interest compounded continuously for 4 years will yield $700? .07 t A

$A = Pe^{rt}$

$\frac{700}{1.3\ldots} = \frac{Pe^{.07(4)}}{1.3\ldots}$

$P = \$529.05$

EX5. If $600 is invested at 6% interest compounded continuously, how long will it take before the amount is $900? P .06 t A

$A = Pe^{rt}$

$\frac{900}{600} = \frac{600e^{.06t}}{600}$

$1.5 = e^{.06t}$

$\log_e 1.5 = .06t$

$\frac{.4\ldots}{.06} = \frac{.06t}{.06}$

$t = 6.76$ years

EX6. How long does it take $1500 to double if it is invested at 6% interest compounded semiannually? t P → A=3000 .06 n=2

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

$\frac{3000}{1500} = \frac{1500\left(1 + \frac{.06}{2}\right)^{2t}}{1500}$

$2 = 1.03^{2t}$

$\log_{1.03} 2 = 2t$

$\frac{23.4\ldots}{2} = \frac{2t}{2}$

$t = 11.72$ years