Section 6.7
Compound Interests

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

A = accumulated amount
P = principal
r = rate
t = time
n = # of compounding periods

agree

n = 1 annually
n = 2 biannually
n = 4 quarterly
n = 12 monthly
n = 360 or 365 years

$A = Pe^{rt}$
compounded continually

IRA (individual retirement account)
roth or traditional
403B
401K

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

$2400
10%
n = 4
t = 20, 30, 40, 50

$A = 2400\ (1 + \frac{0.10}{4})^{4t}$
$A = 2400\ (1.025)^{4t}$
$t = 20 \rightarrow 2400(1.025)^{4(20)} = 17,303$
$t = 30 \rightarrow 2400(1.025)^{4(30)} = 46,459$
$t = 40 \rightarrow 2400(1.025)^{4(40)} = 124,746.88$
$t = 50 \rightarrow 2400(1.025)^{4(50)} = 334,953$

$10,000
12%
n = 4
t = 20, 30, 40, 50

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

$A = 10,000\,(1 + \frac{0.12}{4})^{4(t)}$

$A = 10,000\,(1.03)^{4t}$

$t = 20 \quad 10000(1.03)^{80} = \$106,409$

$120 = \$347,109$
$160 = \$1,132,285$
$200 = \$3,693,558$

$2,000
6% APR
Compound continuously
8 yrs.

$A = Pe^{rt}$

$A = 2.000e^{0.06(8)} = \$3,232.15$

interest = 3232.15 − 2000 = 1232.15

College in 18 yrs = $150,000
$5,000 in gifts
8%
n = 4

$a = P(1 + \frac{r}{n})^{nt}$

$\frac{150,000}{5,000} = \frac{5,000}{5,000}(1 + \frac{0.08}{4})^{4t}$

$30 = (1.02)^{4t}$
$\ln 30 = \ln(1.02)^{4t}$
$\ln 30 = 4t \cdot \ln(1.02)$
$\frac{\ln 30}{4\ln(1.02)} = t = 42.9$