Math 1030 #9b
Savings Plans and Investments
Total and Annual Return
**Total Return** -- the relative change in the investment value over a period of time.

\[
total\ return = \frac{\text{new value} - \text{starting principal}}{\text{starting principal}}
\]

\[
= \frac{A - P}{P} = \frac{A}{P} - 1
\]

(percentage, not a dollar value)

**Annual Return** -- the average annual rate at which your money grew over a period of time.

\[
\text{annual return} = \left(\frac{A}{P}\right)^{1/n} - 1
\]

(also a percentage)

**EX 1:** Three years after buying 20 shares of XYZ stock for $25 per share, you sell the stock for $8500. Find the total and annual return on this investment.

\[
P = 25(20) = 500 \quad A = 8500
\]

Total return: \[
\frac{8500 - 500}{500} = \frac{8000}{500} = \frac{8}{5} = 1.6 = 160\%
\]

Annual return: \[
\left(\frac{8500}{500}\right)^{1/3} - 1 = 1.7 - 1 \approx 1.57128
\]

\[
\approx 157.128\%
\]
Types of Investments

1) Stocks - gives you a share of ownership in a company. The only way to get money from a stock is to sell.

2) Bonds - a promise of future cash. The issuer pays simple interest and promises to pay the principal by some later date.

3) Cash - money deposited in bank accounts, CDs and U.S. Treasury Bills

Things to consider when investing

1) Liquidity - How easy is it to get to your money?

2) Risk - Is the principal invested at risk?

3) Return - How much return (total or annual) do you expect to earn?
EX 2: Which investment in 1900 would have been worth more at the end of 2008?

a) $10 in stocks
b) $75 in bonds
c) $500 in cash

which formula to use?
compound interest formula, compounding annually

\[ A = P (1 + \text{APR})^y \]

(a) \( P = 10, \text{APR} = 6\%, \ y = 108 \)
\[ A = 10 (1 + 0.06)^{108} \]
\[ A \approx \$5,407.96 \]

(b) \( P = 75, \text{APR} = 2.1\%, \ y = 108 \)
\[ A = 75 (1 + 0.021)^{108} \]
\[ A \approx \$707.69 \]

(c) \( P = 500, \text{APR} = 1\%, \ y = 108 \)
\[ A = 500 (1 + 0.01)^{108} \]
\[ A \approx \$1,564.46 \]