Math 1030 #9a
Savings Plans and Investments
Savings Plan Formulas
\[ A = P(1+APR)^Y \]

\[ A = \text{Account balance after } Y \text{ years} \]
\[ P = \text{Principal amount invested} \]
\[ APR = \text{annual percentage rate (as a decimal)} \]
\[ Y = \text{number of years} \]

**Savings Plan Formula (regular payments)**

Suppose you invest $1000 at the end of each year for 5 years in an account that pays 10% interest compounded annually. What is the value after 5 years (future value)?

<table>
<thead>
<tr>
<th>Year</th>
<th>amount generated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1000(1+0.1)^4</td>
</tr>
<tr>
<td>2</td>
<td>1000(1+0.1)^3</td>
</tr>
<tr>
<td>3</td>
<td>1000(1+0.1)^2</td>
</tr>
<tr>
<td>4</td>
<td>1000(1+0.1)</td>
</tr>
<tr>
<td>5</td>
<td>1000(1+0.1)^0</td>
</tr>
<tr>
<td>Total</td>
<td>$6105.10</td>
</tr>
</tbody>
</table>

\[ A = \text{PMT} \cdot \frac{(1+\frac{APR}{n})^{nY} - 1}{\frac{APR}{n}} \]

\[ A = \text{balance after } Y \text{ years} \]
\[ APR = \text{annual interest rate} \]
\[ n = \text{number of payment periods per year} \]
\[ Y = \text{number of years} \]
\[ \text{PMT} = \text{regular payment amount} \]
EX 1: Find the savings plan balance after 5 years with an APR of 2.5% with monthly payments of $100.

\[
A = PMT \cdot \frac{(1 + \frac{APR}{n})^{nY} - 1}{\frac{APR}{n}}
\]

A = balance after Y years
APR = annual interest rate
n = number of payment periods per year
Y = number of years
PMT = regular payment amount
EX 2: At age 28 you begin saving $50 at the end of each month in an account with an APR of 4%. How much will the balance be when you retire at age 65? How does this compare to the amount invested?

\[ A = PMT \cdot \frac{(1 + \frac{APR}{n})^{nY} - 1}{\frac{APR}{n}} \]

EX 3: At age 23 when you graduate, you start saving for retirement. Your investment plan pays an APR of 4.5%. You want to have $5 million when you retire in 45 years. How much should you deposit monthly?

\[ A = PMT \cdot \frac{(1 + \frac{APR}{n})^{nY} - 1}{\frac{APR}{n}} \]