You are responsible for bringing your Financial Calculator to every class session and knowing how to use it correctly to perform the assigned problems. Use this document to test yourself to make sure you are using your calculator correctly.

A good resource is [www.TVMcalcs.com](http://www.TVMcalcs.com), a website that gives instructions for all major models of financial calculators.


**IF YOU HAVE AN HP 12c:** note that when you solve for “N” in Time Value of Money problems, this calculator will always round up the answer to the nearest whole number. Don’t worry about it.

**IF YOU CANNOT GET THE CORRECT ANSWERS AFTER FOLLOWING THE INSTRUCTIONS AND TROUBLESHOOTING STEPS BELOW, YOU ARE RESPONSIBLE FOR COMING TO SEE ME ASAP DURING OFFICE HOURS. DO NOT WAIT UNTIL YOU HAVE TROUBLE ON HOMEWORKS OR TESTS.**

I. **Calculating Simple Overall Growth Rate or Percent Change**

   **Formula:** \( \frac{\text{End Value} - \text{Beginning Value}}{|\text{Absolute Value of Beginning Value}|} \)

   **Simple Test Example 1:**
   
   *Earnings last year were $100 and earnings this year are $110. What is the earnings growth rate (what is the percent change in earnings)?*
   
   \[
   \frac{($110 - $100)}{\text{ABS} \ $100} = \frac{10}{100} = 10\%
   \]

   **Simple Example 2, when Beginning Value is a negative number:** on financial statements, a negative number is indicated with parentheses:
   
   *Earnings last year were a loss of ($100) and earnings this year are a positive $100. What is the earnings growth rate?*
   
   Solution:
   
   \[
   \frac{($100 - (-$100))}{\text{ABS} (-$100)} = \frac{200}{100} = 200\%
   \]

   **Simple Example 3, calculating future value when you know percentage growth:**
   
   *The stock price is currently $100 and you expect it to grow 10% next year. What will the stock price be a year from now?*
   
   **Formula:** Beginning Value \( x \) (1 + percentage growth, expressed as a decimal)
   
   Solution:
   
   \[
   $100 \times (1 + 0.10) = $110
   \]
II. **Calculating Average Annual Growth Rate over Multiple Periods;**
also known as Average Compound Growth Rate (ACGR)

**Formula:** \((\text{Overall Percent Change} + 1)^{\frac{1}{\#\text{Periods}}} - 1\)

**Simple Example 1:**
*Earnings two years ago were $100 and earnings this year are $110. What is the average annual earnings growth rate?*

**Solution:**

Step 1: Calculate OVERALL percent growth for the two year period using the formula above:
\[
\frac{($110 - $100)}{(\text{ABS} \ $100)}
\]
\[= \frac{10}{100} = 10\% \text{ which is the same as 0.10 in decimal form}\]

Step 2: Calculate AVERAGE ANNUAL growth rate:
\[
(0.10 + 1)^{\frac{1}{2}} - 1
\]
\[= 1.10^{0.5} - 1 = 1.048809 - 1 = .048809 \text{ which is the same as 4.8809\%}\]

*NOTE that due to the power of compounding, the average annual growth is NOT 5\% per year, it is slightly less.*

**Simple Example 2, when Beginning Value is a negative number, indicated with parentheses:**
*Earnings two years ago were a loss of ($100) and earnings this year are a positive $100. What is the earnings growth rate?*

**Solution:**

Step 1: Calculate OVERALL percent growth for the two year period using the formula above:
\[
\frac{($100 - (-$100))}{(\text{ABS} -$100))}
\]
\[= \frac{200}{100} = 200\% \text{ which is the same as 2.00 in decimal form}\]

Step 2: Calculate AVERAGE ANNUAL growth rate:
\[
(2.00 + 1)^{\frac{1}{2}} - 1
\]
\[= 3.00^{0.5} - 1 = 1.732051 - 1 = .732051 \text{ which is the same as 73.2051\%}\]

**Simple Example 3: calculating a future value when you know annual growth rate**

**Formula:** Beginning Value \(x\) \((1 + \text{growth rate expressed as a decimal})^\#\text{of growth periods}\)

*The stock price is currently $100 and you expect it to grow 10\% per year for each of the next 5 years. What should the stock price equal five years from now?*

**Solution:**

\[\$100 \times (1 + 0.10)^5\]
\[= \$100 \times 1.61051\]
\[= \$161.05\]
III. Calculating Growth Rate using Time Value of Money (TVM) Functions on your Calculator

Formula:
- PV = Beginning Value
- FV = End Value
- N = number of periods from beginning to end
- I = growth rate per period

Simple Example:
Earnings last year were $100 and earnings this year are $110. What is the earnings growth rate?
Input PV = ($100) \text{NOTE: you are inputting a negative number for PV. See Troubleshooting for more detail.}
Input FV = $110
Input N = 1
Solve for i = 10.0000%

Troubleshooting:

a. If you get i = “ERROR” or “No Solution”: it means you did not put in PV as a negative number and FV as a positive number. You must learn how to input negative numbers on your calculator. WARNING: do NOT use the “minus” key! You must use the “change value” key. On some calculators this is labelled “+/−”, on other calculators it is labelled “CHG”. Learn your calculator’s buttons.

b. If you get i = 8.3333%: it means your calculator setting for number of periods per year is wrong; this button may be called “NPER” or something similar. Set it for 1 period per year. This is the only setting you should use during this course.

c. If you get i = 120: it means your calculator setting for number of periods per year is wrong, it’s set to “12” when it should be “1”; this button may be called “NPER” or something similar. Set it for 1 period per year. This is the only setting you should use during this course.

d. If you do not see at least 4 decimal places: it means your calculator setting for number of decimal places is wrong; this button may be called “FORMAT” or “DISPLAY.” Set it for 4 decimal places.

e. If you see a comma instead of a decimal point: it means your calculator is set to “international” display settings, figure out how to set it to U.S. format or you will get confusing results.

f. If you see the words “BEG” appear anywhere on your screen: it means your calculator is set to “beginning of period” payment calculation rather than the correct “end of period” setting: figure out how to set it to “end of period” or you will get INCORRECT results for all problems that involve Payments. This is the only setting you should use during this course. When it is set to “end of period,” it will not show the letters “BEG”.

g. If you get some other numerical result: it may mean that you did not properly clear the calculator before starting the problem. Figure out how to properly clear all fields on your calculator and do this before solving every problem.
IV. Converting Non-Annual Rate of Return to an Annual Rate of Return

Must use this formula when you have solved for a daily, monthly, quarterly or semi-annual “i” and need to convert it to an annual rate in order to complete the problem.

a. USING ALGEBRA: Note this is similar to Calculator Problem 2, Example 3, above

Formula: 
$$((\text{Non-annual Rate} + 1) ^ \text{Number of Periods per Year}) - 1$$

MUST use the decimal form of the rate, e.g., a rate of 10% = 0.10

Simple Example 1:
You are earning interest of 1% per month on your savings account. What is your annual rate of return?

Solution:
$$((0.01 + 1) ^ 12) - 1$$
$$= (1.01 ^ 12) - 1$$
$$= 1.12682503 - 1$$
$$= .12682503$$ which is the same as 12.6825% per year

NOTE that due to the power of compounding, the annual rate of return is NOT 12% per year, it is slightly higher.

b. USING TVM FUNCTIONS

Simple Example 1:
You are earning interest of 1% per month on your savings account. What is your annual rate of return?

Solution: HINT: use $1.00 as a simple test value!

$$PV = ($1.00)$$
$$PMT = 0$$
$$N = 12 \text{ months}$$
$$i = 1\%$$

solve for $$FV = $1.1268$$

By what percentage did your investment grow during the year?
$$\left(\frac{$1.1268 - $1.00}{ABS($1.00)}\right)$$
$$= .1268 = 12.68\%$$
V. Using the NPV and IRR Functions on your Calculator to solve problems with uneven Payments

NOTE: if you do not have the recommended TI BAII+, HP 10bii, or HP 12c calculators, you must find your own instructions and ensure you get the same answers.

NET PRESENT VALUE:

INVEST $100 TODAY, RECEIVE $25 AT THE END OF 1 YEAR, RECEIVE $150 AT END OF 2 YEARS, REQUIRED RATE OF RETURN = 10%, WHAT IS NPV?

<table>
<thead>
<tr>
<th>TEXAS INSTRUMENTS BAII PLUS</th>
<th>HP 10Bii</th>
<th>HP 12c</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF (starts the NPV and IRR program) 2^{nd} Clr Work</td>
<td>Clear calculator</td>
<td>f FIN (clears finance keys)</td>
</tr>
<tr>
<td>100 +/- ENTER (sets CF0, starting investment)</td>
<td>100 +/- CFj</td>
<td>100 CHS g CFo</td>
</tr>
<tr>
<td>Arrow down</td>
<td>25 CFj</td>
<td>25 g CFj</td>
</tr>
<tr>
<td>25 ENTER (sets C01, payment at end of year 1)</td>
<td>150 CFj</td>
<td>150 g CFj</td>
</tr>
<tr>
<td>Arrow Down</td>
<td>10 I/YR</td>
<td>10 i</td>
</tr>
<tr>
<td>1 ENTER (sets F01, this payment occurs once)</td>
<td>Shift NPV</td>
<td>f NPV</td>
</tr>
<tr>
<td>Arrow Down</td>
<td>Should say $46.69</td>
<td>Should say $46.69</td>
</tr>
<tr>
<td>150 ENTER (sets C02, payment received end of year 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arrow Down</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 ENTER (sets F02, this payment occurs once)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPV 10 ENTER (sets discount rate i)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arrow Down CPT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Should say NPV = $46.69</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

INTERNAL RATE OF RETURN:

INVEST $100 TODAY, RECEIVE $25 AT THE END OF 1 YEAR, RECEIVE $150 AT END OF 2 YEARS, WHAT IS IRR?

<table>
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<td>CF (starts the NPV and IRR program) 2^{nd} Clr Work</td>
<td>Clear calculator</td>
<td>f FIN (clears finance keys)</td>
</tr>
<tr>
<td>100 +/- ENTER (sets CF0, starting investment)</td>
<td>100 +/- CFj</td>
<td>100 CHS g CFo</td>
</tr>
</tbody>
</table>
VI. Calculating a Weighted Average

**Formula:** Set up a simple table of 3 columns: Values, Weights, and Weighted Values. Then add up the Weighted Values.

**Simple Example:**
You have $75,000 invested in Stocks with an average return of 10% and $25,000 invested in Bonds with an average return of 5%. What is the weighted average return on your investments?

**Solution:**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Weight</th>
<th>Weighted Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stocks</td>
<td>10%</td>
<td>75%</td>
<td>7.50%</td>
</tr>
<tr>
<td>Bonds</td>
<td>5%</td>
<td>25%</td>
<td>1.25%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Weighted Average</strong> (sum of weighted values) 8.75%</td>
</tr>
</tbody>
</table>

**IMPORTANT:** use the same procedure for all weighted average calculations, such as weighted average return on investment, weighted average cost of capital (WACC), weighted average Portfolio Beta, etc.

The **VALUE** column shows what measurement you are trying to calculate a weighted average of (return on investment, cost of capital, Beta, etc.)

The **WEIGHTS** shows what proportion each component makes up as a percent of the total, and column **must always add up to 100%.**
EXTRA PRACTICE PROBLEMS:

I. A. Calculating Simple Overall Growth Rate or Percent Change

**Formula:** \( \frac{\text{End Value} - \text{Beginning Value}}{\text{Absolute Value of Beginning Value}} \)

<table>
<thead>
<tr>
<th>Question</th>
<th>Equation</th>
<th>Correct Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>This year you sold 520 rabbits at a price of $2 each. Next year you plan to sell 800 rabbits and increase prices by 50 cents per rabbit. What percent growth in sales are you expecting?</td>
<td>( \frac{(800 \times 2.50) - (520 \times 2.00)}{(520 \times 2.00)} )</td>
<td>92.31%</td>
</tr>
<tr>
<td>What will be the percent growth in sales if you sell 1,000 rabbits next year at a price of $3.00?</td>
<td>(you write the equation)</td>
<td>188.46%</td>
</tr>
<tr>
<td>What will be the percent change in sales if your actual sales next year are only 400 rabbits at $2.50?</td>
<td></td>
<td>(3.85%)</td>
</tr>
<tr>
<td>Your company had 1,400 employees last year but this year has laid off 300. What is your percent change in headcount?</td>
<td></td>
<td>(21.43)%</td>
</tr>
<tr>
<td>Last year your company had a net loss of $(400,000). This year you had a net profit of $600,000. By what percent did profits improve?</td>
<td></td>
<td>250.00%</td>
</tr>
</tbody>
</table>

B. Calculating future value when you know percentage growth:

**Formula:** \( \text{Beginning Value} \times (1 + \text{percentage growth, expressed as a decimal}) \)

<table>
<thead>
<tr>
<th>Question</th>
<th>Equation</th>
<th>Correct Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>This year you sold 520 rabbits at a price of $2 each. Next year you plan to sell 40% more rabbits and increase price per rabbit by 50%. What will your total sales be?</td>
<td>( (520 \times 1.4) \times (2.00 \times 1.5) )</td>
<td>$2,184</td>
</tr>
<tr>
<td>What will your total sales be next year if you sell 80% more rabbits, but DECREASE prices by 50%?</td>
<td></td>
<td>$936</td>
</tr>
<tr>
<td>You own real estate worth $2mm and expect it to grow in value 20% per year for the next 2 years. What will it be worth in 2 years?</td>
<td></td>
<td>$2.88mm</td>
</tr>
<tr>
<td>Your team has a goal to increase sales 35%. Currently you sell 10 cellphones per week at</td>
<td></td>
<td>14 (13.5 rounded)</td>
</tr>
</tbody>
</table>
$80/phone. How many phones do you need to sell per week to meet your goal?

What if you raise price per phone by 25%: how many phones do you need to sell per week to meet your goal?  11 (10.8 rounded)

II.  A. Calculating Average Annual Growth Rate over Multiple Periods; also known as Average Compound Growth Rate (ACGR)
Formula:  \((\text{Overall Percent Change} + 1)^{\text{1/ # Periods}} - 1\)

<table>
<thead>
<tr>
<th>Question</th>
<th>Equation</th>
<th>Correct Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your healthcare costs have grown 60% over the past 3 years. What is the average annual growth rate?</td>
<td>((0.60 + 1)^{\text{1/3}} - 1)</td>
<td>16.96%</td>
</tr>
<tr>
<td>Inflation in Brazil was 48% last year. By what percent did the cost of living increase each month on average during the course of the year?</td>
<td></td>
<td>3.32%</td>
</tr>
<tr>
<td>Your parents bought their home 10 years ago for $500,000. It is worth $850,000 today. What has been the average annual appreciation rate?</td>
<td></td>
<td>5.45%</td>
</tr>
<tr>
<td>Your first year in business you had sales of $100,000. In your sixth year, your sales were $1mm. What has been your average annual growth rate in sales over 5 years?</td>
<td></td>
<td>58.49%</td>
</tr>
<tr>
<td>The first week of school you sold 100 ice cream cones. The last week of the semester you sold 600. What was your average weekly increase in sales over the 15 week semester?</td>
<td></td>
<td>12.69%</td>
</tr>
</tbody>
</table>

B. Calculating a future value when you know annual growth rate
Formula:  \(\text{Beginning Value} \times [ (1 + \text{growth rate expressed as a decimal})^{\# \text{ of growth periods}} ]\)

<table>
<thead>
<tr>
<th>Question</th>
<th>Equation</th>
<th>Correct Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>You put $5,000 into an investment fund and expect it to appreciate on average 6% per year. How much should it be worth after 10 years?</td>
<td>(5,000 \times [(1 + .06)^{10}])</td>
<td>$8,954</td>
</tr>
<tr>
<td>You buy ten goldfish for your pond and expect them to multiply in number by 10% per month. How many will you have after 1 year?</td>
<td></td>
<td>31</td>
</tr>
</tbody>
</table>
The golf ball industry is currently $1b and expected to grow at a steady state of 3% per year. How big will it be 20 years from now? | $1.81b
---|---
You are a McDonald’s franchisee with 5 stores. You feel you can grow your number of stores 25% per year. How many stores will you have 10 years from now? | 46
The population of North Dakota is 740,000 people and is shrinking at 1% per year. How many people will be there 10 years from now? | 669,242

III. **Calculating Growth Rate using Time Value of Money (TVM) Functions on your Calculator**

**Formula:** PV = Beginning Value, FV = End Value, PMT = cash flows in or out per compounding period, N = number of compounding periods from beginning to end, I = growth rate per compounding period

<table>
<thead>
<tr>
<th>Question</th>
<th>Equation</th>
<th>Correct Answer:</th>
</tr>
</thead>
<tbody>
<tr>
<td>You are interested in investing in the stock of a cool skateboard manufacturing company. You have decided that a 12% annual rate of return would be the minimum you would want to earn given the risk of such an investment. Analysts estimate that the stock, which pays no dividends, will be worth $10.80/share one year from now. What is the HIGHEST price you can pay for the stock today to achieve your return on investment goal?</td>
<td>PV = ? FV = 10.80 PMT = 0 N = 1 I = 12</td>
<td>$9.64</td>
</tr>
<tr>
<td>You invest $11,000 into an account that will give you a quarterly return of 2%, which you plan to keep reinvesting in the same account, but you don’t plan to add any more capital to the account. How much will you have after 5 years?</td>
<td>PV = (11,000) FV = ? PMT = 0 N = 20 I = 2</td>
<td>$16,345</td>
</tr>
<tr>
<td>You have $5,000 in an investment account with a monthly interest rate of 0.5%. You want to buy a car that costs $15,000. How long will it take you to save enough money in this account to buy the car (assuming the price of the car doesn’t change)?</td>
<td>PV = (5,000) FV = 15,000 PMT = 0 N = ? I = 0.5</td>
<td>221 months or 18.4 years</td>
</tr>
<tr>
<td>Five years ago, you invested $25,000 in Netflix stock, which pays no dividend. Today your stock is worth $42,000. What has been the average annual rate of appreciation in the stock?</td>
<td>PV = (25,000) FV = 42,000 PMT = 0 N = 5 I = ?</td>
<td>10.93%</td>
</tr>
</tbody>
</table>
### Five years ago, you bought 100 shares of Nike stock at a price of $25.00/share. The stock price has been appreciating by 12% per year, and Nike has been paying a consistent $1/share quarterly dividend, which you always reinvest in the stock. What is your total investment worth today?

| PV = (2,500) | FV = ? | PMT = (100) | N = 20 | I = 3 | $7,202.32 |

### You have a $3,000 balance on your credit card bill. It carries a 24% nominal annual interest rate, compounded monthly. You can afford to pay it off in chunks of $150/month. How long will it take you to pay it off, if you don’t charge any more on it?

| PV = 3,000 | FV = 0 | PMT = (150) | N = ? | I = 2 | 26 x 150 | 26 months | $3,900 |

### IV. Converting Non-Annual Rate of Return to an Annual Rate of Return

<table>
<thead>
<tr>
<th>Algebra</th>
<th>TVM</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>(((1 + \text{Non-annual Rate})^{\text{Number of Periods per Year}}) - 1)</td>
<td>PV = (1.00) FV = ? PMT = 0 N = # I = %.9167</td>
<td>11.57%</td>
</tr>
<tr>
<td>((1 + \text{Non-annual Rate})^{\text{Number of Periods per Year}}) - 1</td>
<td>PV = (1.00) FV = ? PMT = 0 N = # I = %.2115</td>
<td>11.61%</td>
</tr>
<tr>
<td>((1 + \text{Non-annual Rate})^{\text{Number of Periods per Year}}) - 1</td>
<td>PV = (1.00) FV = ? PMT = 0 N = # I = %.15131</td>
<td>19.75%</td>
</tr>
</tbody>
</table>

### Aladdin Loans is offering you a $1,000 loan at a nominal annual rate of 11%, compounding monthly. What is the annual effective rate?

| PV = (1.00) FV = ? PMT = 0 N = \# I = \%.9167 | 11.57% |

### Zebra Loans is offering you a $1,000 loan at a nominal annual rate of 11%, compounding weekly. What is the annual effective rate?

| PV = (1.00) FV = ? PMT = 0 N = \# I = \%.2115 | 11.61% |

### Magellan Loans is offering you a $1,000 loan that needs to be paid back over two years, in 24 monthly payments of $50. What is the annual effective rate on this loan?

**Step 1**: Calculate the monthly rate: PV = 1000, FV = 0, n = 24, PMT = (50), solve for i

**Step 2**: Convert to an annual rate:

| PV = (1.00) FV = ? PMT = 0 N = \# I = \%.15131 | 19.75% |

### You buy a share of stock for $90. It pays a $1/qtr dividend. You sell it for $100 in 18 months, right after getting your 6th dividend payment. What is your annual effective rate of return?

**Step 1**: Calculate the monthly rate: PV = (90), FV = 100, n = 6, PMT = 1, solve for i

**Step 2**: Convert to an annual rate:

| PV = (1.00) FV = ? PMT = 0 N = \# I = \%.2836 | 11.84% |
V. Using the NPV and IRR Functions on your Calculator to solve problems with uneven Payments

<table>
<thead>
<tr>
<th>Question</th>
<th>Equation</th>
<th>Correct Answer:</th>
</tr>
</thead>
<tbody>
<tr>
<td>You start a skateboard rental business. Your initial investment is $10,000</td>
<td>Initial CF: (10,000) CF 1: (1200) Frequency: 1 CF 2: 3500 Frequency: 1 CF 3: 5000 Frequency: 2 Final CF: 3000+1000 =4000 i = 10</td>
<td>IRR: 14.17% NPV: $1,457</td>
</tr>
<tr>
<td>investment is $10,000 to buy the skateboards and create a website. The first year you have a net cash loss of $1200 (not counting the initial investment.) The second year you have a net positive cash flow of $3500. The third year and 4th year you have a positive cash flow of $5000 per year. The final year you net $3000 from operations and liquidate your used skateboard inventory for $1000. What was your Internal Rate of Return on this venture? If your required rate of return was 10% per year, was was the Net Present Value of this project?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>You buy a stock for $40/share, and hold it for 4 ½ years. You receive a quarterly cash dividend at the end each quarter. The dividend payments you receive are in the amount of $1/share for the first three quarters, then $2/share for the next four quarters, then $3/share for the next four quarters, then $4/share for the next four quarters, then $5/share for the final three quarters. As soon as you receive the last dividend payment, you sell the stock for $42. What is your IRR on this investment PER QUARTER? What is your IRR PER YEAR? (use calculator problem 4) If your required rate of return was 20% PER YEAR, what was the Net Present Value of this investment? (use 5% discount rate since your cash flows are quarterly)</td>
<td>Initial CF: (40) CF 1: 1.00 Frequency: 3 CF 2: 2.00 Frequency: 4 CF 3: 3.00 Frequency: 4 CF 4: 4.00 Frequency: 4 CF 5: 5.00 Frequency: 2 Final CF: 5+42=47 i = 5</td>
<td>IRR: 6.59%/qtr 29.08%/year NPV: $8.70/share</td>
</tr>
<tr>
<td>You borrow $16,000 to pay for college. It is a fully amortizing, ten year loan with required monthly payments of $50/month for the first four years, then $250/month for four years, then $500/month for the final two years. What is the effective MONTHLY financing rate? (calculate IRR) What is the effective ANNUAL financing rate? (use calculator problem 4 to annualize) If you could get a government guaranteed loan at a 6% annual rate, what would be the net present value of your cost savings? (use 0.5% discount rate since your cash flows are monthly)</td>
<td>Initial CF: 16,000 CF 1: (50) Frequency: 48 CF 2: (250) Frequency: 48 CF 3: (500) Frequency: 24 i = 0.5</td>
<td>0.6126%/month 7.604%/year NPV of savings: $1,497</td>
</tr>
</tbody>
</table>
VI. Calculating a Weighted Average

**Formula:** Set up a simple table of 3 columns: Values, Weights, and Weighted Values. Use regular math and algebra to solve for the answer.

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<tr>
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<tbody>
<tr>
<td>A student’s grade in a course comprised of 40% tests, 20% quizzes, 20% homework, and 20% project. The student got 85 in tests, 100 in quizzes, 92 in papers, and 84 for the project. What is the final grade?</td>
<td>Value</td>
<td>Weight</td>
</tr>
<tr>
<td>Test 85</td>
<td>40%</td>
<td>34.0</td>
</tr>
<tr>
<td>Quiz 100</td>
<td>20%</td>
<td>20.0</td>
</tr>
<tr>
<td>Paper 92</td>
<td>20%</td>
<td>18.4</td>
</tr>
<tr>
<td>Project 84</td>
<td>20%</td>
<td>16.8</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100%</td>
<td>?</td>
</tr>
</tbody>
</table>

You have a diversified investment portfolio. 60% of your money is invested in stocks, 20% is invested in bonds, and the rest is invested in cash (bank account). You have been averaging an overall return on investment of 9%/year. Your stock holdings have an average rate of return of 12%, and your cash account has a return of 0%. What rate of return has your bond portfolio provided?

<table>
<thead>
<tr>
<th>Equation</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>?</td>
<td>9.0%</td>
</tr>
</tbody>
</table>

In a company with 20 employees, there are 6 software developers who each make $150,000/yr, and 4 managers who each make $450,000/yr. There are also 10 administrators. If the average annual salary for the company overall is $175,000 per year, what is the average annual salary of each administrator?

<table>
<thead>
<tr>
<th>Equation</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>?</td>
<td>$80,000</td>
</tr>
</tbody>
</table>

The SJSU Tennis Team plays 15 matches in the season. During the first 10 matches the first serve was hit 80% of the time. During the last 5 matches the first serve was hit 50% of the time. What percentage of the first serves were hit for the whole season?

<table>
<thead>
<tr>
<th>Equation</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>?</td>
<td>70%</td>
</tr>
</tbody>
</table>

After its first few years in business, Uber had raised $1b in total financing (total market value). $100mm came from unsecured bank loans with a yield of 8%, $400mm came from bonds with a yield of 6%, $300mm came from preferred stock with a yield of 12%, and the rest came from common stock with a yield of...
20%. What was Uber’s weighted average cost of capital? (ignore taxes)