There are 4 versions of Quiz. Find Your version.
1. Jeff has been saving for his retirement over the last three years. He began with a balance of 300,000 on January 1, 2013. On May 31, 2013, he had a balance of 310,000 and deposited another 45,000 into the account. On January 31, 2014, Jeff bought a retirement house in Florida. He used money in his retirement account as a down payment by withdrawing 28,000. Prior to this withdrawal, Jeff’s balance was 340,000. On May 31, 2015, Jeff had 400,000 and he deposited another 56,000. On December 31, 2015, Jeff have 500,000.

Determine the annual time weighted return over the three year period.

Solution:

\[
1 + j_1 = \frac{310,000}{325,000}
\]

\[
1 + j_2 = \frac{340,000}{310,000 + 45,000}
\]

\[
1 + j_3 = \frac{400,000}{340,000 - 28,000}
\]

\[
1 + j_4 = \frac{500,000}{400,000 + 56,000}
\]

\[
1 + j_{TW} = \left(\frac{310,000}{325,000}\right)\left(\frac{340,000}{310,000 + 45,000}\right)\left(\frac{400,000}{340,000 - 28,000}\right)\left(\frac{500,000}{400,000 + 56,000}\right)
\]

\[= 1.391238419\]

\[1 + i_{TW} = (1 + j_{TW})^{1/3} \implies i_{TW} = (1.391238419)^{1/3} - 1 = 0.11635 = 11.63\% \]
2. Sammy borrows 50,000 from Ben. Sammy will repay the loan with five annual payments of 13,000.

Ben will take the payments made by Sammy and reinvest the payments at an annual effective interest rate of 8%.

Determine the annual return that Ben will receive on the loan when reinvestment is taken into account.

Solution:

\[(13,000)(1.08)^4 + (13,000)(1.08)^3 + (13,000)(1.08)^2 + (13,000)(1.08) + (13,000) = 76,265.81248\]

\[(50,000)(1 + i)^5 = 76,265.81248\]

\[i = \left(\frac{76,265.81248}{50,000}\right)^\frac{1}{5} - 1 = 0.088108 = 8.8108\%\]
3. Ayanna borrows 10,000 to be repaid with three payments of $P$. The first payment will be made one year from the date of the loan. The second payment will be made four years from the date of the loan. The final payment will be made five years from the date of the loan.

The annual effective interest rate on the loan is 6%.

Determine $P$.

**Solution:**

\[
\begin{align*}
10000 & \quad P & \quad P & \quad P \\
0 & \quad 1 & \quad 2 & \quad 3 & \quad 4 & \quad 5 \\
\end{align*}
\]

\[
(10,000)(1.06)^5 = P(1.06)^4 + P(1.06) + P
\]

\[
13,382.25578 = 3.32247696P
\]

\[
P = 4027.79
\]
1. Sammy borrows 50,000 from Ben. Sammy will repay the loan with five annual payments of 14,000.

Ben will take the payments made by Sammy and reinvest the payments at an annual effective interest rate of 8%.

Determine the annual return that Ben will receive on the loan when reinvestment is taken into account.

**Solution:**

\[
(14,000)(1.08)^4 + (14,000)(1.08)^3 + (14,000)(1.08)^2 + (14,000)(1.08) + (14,000) = 82,132.41344
\]

\[
(50,000)(1+i)^5 = 82,132.41344
\]

\[
i = \left(\frac{82,132.41344}{50,000}\right)^{\frac{1}{5}} - 1 = 0.1043555 = 10.43555\%
\]
2. Ayanna borrows $10,000 to be repaid with three payments of $P$. The first payment will be made two years from the date of the loan. The second payment will be made four years from the date of the loan. The final payment will be made five years from the date of the loan.

The annual effective interest rate on the loan is 7%.

Determine $P$.

**Solution:**

\[
\begin{array}{cccccc}
 & P & P & P \\
0 & 1 & 2 & 3 & 4 & 5 \\
\hline
10,000 \\
\end{array}
\]

\[ (10,000)(1.07)^5 = P(1.07)^3 + P(1.07) + P \]

14,025.51731 = 3.295043$P$

$P = 4256.55$
3. Jeff has been saving for his retirement over the last three years. He began with a balance of 300,000 on January 1, 2013. On May 31, 2013, he had a balance of 320,000 and deposited another 45,000 into the account. On January 31, 2014, Jeff bought a retirement house in Florida. He used money in his retirement account as a down payment by withdrawing 28,000. Prior to this withdrawal, Jeff’s balance was 352,000. On May 31, 2015, Jeff had 400,000 and he deposited another 56,000. On December 31, 2015, Jeff have 500,000.

Determine the annual time weighted return over the three year period.

4. Solution:

\[ 1 + j_1 = \frac{320,000}{300,000} \]

\[ 1 + j_2 = \frac{352,000}{320,000 + 45,000} \]

\[ 1 + j_3 = \frac{400,000}{352,000 - 28,000} \]

\[ 1 + j_4 = \frac{500,000}{400,000 + 56,000} \]

\[ 1 + j_{TW} = \left( \frac{320,000}{300,000} \right) \left( \frac{352,000}{320,000 + 45,000} \right) \left( \frac{400,000}{352,000 - 28,000} \right) \left( \frac{500,000}{400,000 + 56,000} \right) \]

= 1.392511

\[ 1 + i_{TW} = (1 + j_{TW})^{UT} \implies i_{TW} = (1.392511)^{1/3} - 1 = 0.116691 = 11.669\% \]
1. Ayanna borrows 10,000 to be repaid with three payments of $P$. The first payment will be made two years from the date of the loan. The second payment will be made three years from the date of the loan. The final payment will be made five years from the date of the loan.

The annual effective interest rate on the loan is 8%.

Determine $P$.

**Solution:**

\[
\begin{array}{cccccc}
\text{0} & \text{1} & \text{2} & \text{3} & \text{4} & \text{5} \\
10,000
\end{array}
\]

\[
(10,000)(1.08)^5 = P(1.08)^3 + P(1.08)^2 + P
\]

14,693.28077 = 3.426112$P$

$P = 4288.62$
2. Jeff has been saving for his retirement over the last three years. He began with a balance of $300,000 on January 1, 2013. On May 31, 2013, he had a balance of $325,000 and deposited another $40,000 into the account. On January 31, 2014, Jeff bought a retirement house in Florida. He used money in his retirement account as a down payment by withdrawing $38,000. Prior to this withdrawal, Jeff's balance was $348,000. On May 31, 2015, Jeff had $390,000 and he deposited another $65,000. On December 31, 2015, Jeff have $500,000.

Determine the annual time weighted return over the three year period.

**Solution:**

\[
1 + j_1 = \frac{325,000}{310,000}
\]

\[
1 + j_2 = \frac{348,000}{325,000 + 40,000}
\]

\[
1 + j_3 = \frac{390,000}{348,000 - 38,000}
\]

\[
1 + j_4 = \frac{500,000}{390,000 + 65,000}
\]

\[
1 + j_{TW} = \left(\frac{325,000}{310,000}\right) \left(\frac{348,000}{325,000 + 40,000}\right) \left(\frac{390,000}{348,000 - 38,000}\right) \left(\frac{500,000}{390,000 + 65,000}\right)
\]

\[
= 1.427941173
\]

\[
1 + i_{TW} = (1 + j_{TW})^{\frac{1}{3}} \implies i_{TW} = \left(1.427941173\right)^{\frac{1}{3}} - 1 = 0.126082 = 12.608\%
\]
3. Sammy borrows 50,000 from Ben. Sammy will repay the loan with five annual payments of 12,000.

Ben will take the payments made by Sammy and reinvest the payments at an annual effective interest rate of 6%.

Determine the annual return that Ben will receive on the loan when reinvestment is taken into account.

**Solution:**

\[
(12,000)(1.06)^4 + (12,000)(1.06)^3 + (12,000)(1.06)^2 + (12,000)(1.06)^1 + (12,000) = 67,645.11552
\]

\[
(50,000)(1+i)^5 = 67,645.11552
\]

\[
i = \left( \frac{67,645.11552}{50,000} \right)^{\frac{1}{5}} - 1 = 0.062315 = 6.2315%
\]
1. Ben borrows 20,000 at an annual effective interest rate of 9%. The loan will be repaid with a payment of $Q$ at the end of one year, a payment of $Q$ at the end of three years, and a payment of $Q$ at the end of four years.

Determine $Q$.

**Solution:**

\[
\begin{array}{cccc}
& Q & Q & Q \\
0 & 1 & 2 & 3 & 4
\end{array}
\]

\[
20,000 (1.09)^4 = Q(1.09)^3 + Q(1.09) + Q
\]

\[
28,231.6322 = 3.385029P
\]

\[
P = 8340.14
\]
2. Ayanna has a loan of 50,000 which will be repaid with five annual payments of 12,500. The lender will take the payments and reinvest the payments at an annual effective interest rate of 10%.

Taking into account reinvestment, calculate the annual return that the lender will receive on the loan.

**Solution:**

\[
(12,500)(1.10)^4 + (12,500)(1.10)^3 + (12,500)(1.10)^2 + (12,500)(1.10)^1 + (12,500) = 73,313.75
\]

\[
(50,000)(1+i)^5 = 73,313.75
\]

\[
i = \left( \frac{73,313.75}{50,000} \right)^{\frac{1}{5}} - 1 = 0.88244694 = 8.8245\%
\]
3. Jeff has been saving for his retirement over the last three years. He began with a balance of 300,000 on January 1, 2013. On May 31, 2013, he had a balance of 280,000 and deposited another 40,000 into the account. On January 31, 2014, Jeff bought a retirement house in Florida. He used money in his retirement account as a down payment by withdrawing 32,000. Prior to this withdrawal, Jeff’s balance was 335,000. On May 31, 2015, Jeff had 700,000 and he deposited another 80,000. On December 31, 2015, Jeff have 500,000.

Determine the annual time weighted return over the three year period.

**Solution:**

\[ 1 + j_1 = \frac{280,000}{300,000} \]

\[ 1 + j_2 = \frac{335,000}{280,000 + 40,000} \]

\[ 1 + j_3 = \frac{700,000}{335,000 - 32,000} \]

\[ 1 + j_4 = \frac{500,000}{700,000 + 80,000} \]

\[ 1 + j_{TW} = \left( \frac{280,000}{300,000} \right) \left( \frac{335,000}{280,000 + 40,000} \right) \left( \frac{700,000}{335,000 - 32,000} \right) \left( \frac{500,000}{700,000 + 80,000} \right) \]

\[ = 1.446979634 \]

\[ 1 + i_{TW} = (1 + j_{TW})^{\frac{1}{3}} \implies i_{TW} = \left(1.446979634\right)^{\frac{1}{3}} - 1 = 0.134064763 = 13.406\% \]