EXERCISES -1 (SOLUTIONS)

1.

a. The return on this investment is:

$$\text{Return} = \frac{115,000 - 100,000}{100,000} = 0.15$$

b. If the return is lower than the interest rate then the investment has a negative NPV.

c. If r = 10% then,

$$\text{PV} = \frac{115,000}{1.10} = 104,545$$

d. $\text{NPV} = 104,545 - 100,000 = 4,545$

2. We know that:

$$\text{PV} = \text{DF} \times \text{FV} \Rightarrow 178.57 = \text{DF} \times 200 \Rightarrow \text{DF} = \frac{178.57}{200} \Rightarrow \text{DF} = 0.8928$$

If r is the discount rate then,

$$\text{DF} = \frac{1}{1+\text{r}} \Rightarrow \text{r} = \frac{1}{\text{DF}} - 1 \Rightarrow \text{r} = \frac{1}{0.8928} - 1 = 0.12$$

3. The initial cash flow for this investment is C_0 = 500,000 + 800,000 = $1,300,000. Therefore, the net present value is:

$$\text{NPV} = -1,300,000 + \frac{1,500,000}{1.10} = \$63,636$$

Since, the NPV is positive you would construct the motel.
Alternatively, the return of this investment is:

$$\text{Return} = \frac{1,500,000 - 1,300,000}{1,300,000} = 15.39\%$$

Since the rate of return is greater than the cost of capital (10%), you would construct the motel.

4.

a. The investment offered has an initial cash flow of C_0 = -50,000 + 20,000 = -$30,000. Since, the $38,000 will be paid with certainty the appropriate discount rate is the return of the U.S. government securities. Thus,

$$\text{NPV} = -30,000 + \frac{38,000}{1.05} = \$6,190$$

Since the NPV is greater than the NPV of the office building ($5,000) we should accept the offer.

b. You observe that other investors demand a 10% return on their loans to the firm. This can be viewed as the return of an investment with equivalent risk, thus it is the appropriate discount rate. Then,

$$\text{NPV} = -30,000 + \frac{38,000}{1.10} = \$4,545$$

Since the NPV is less than the NPV of the office building ($5,000) we should not accept the offer.

5. The following table presents the NPV of the rate of return of the 4 investments.

Investment	NPV	Return
(1)	$-10,000+\frac{18,000}{1.20}=\$5,000$	$\frac{18,000-10,000}{10,000}=0.80=80.0\%$
(2)	$-5,000+\frac{9,000}{1.20}=\$2,500$	$\frac{9,000-5,000}{5,000}=0.80=80.0\%$
(3)	$-5,000+\frac{5,700}{1.20}=-\$250$	$\frac{5,700-5,000}{5,000}=0.14=14.0\%$
(4)	$-2,000+\frac{4,000}{1.20}=\$1,333.33$	$\frac{4,000-2,000}{2,000}=1.00=100.0\%$

a. Investment 1, because it has the highest NPV.
b. Investment 1, because it maximizes shareholders' wealth.

6.

a. The NPV of investing in government bond is zero. Investments in financial markets provide a zero NPV. This comes from the fact that the cost of acquiring the bonds (i.e, their market value) is equal to the PV of their future cash flows.

b. $\text{NPV}=-1+\frac{1.1}{1.12}=-0.017$

c. The NPV of investing in the stock market is zero. Some reason as in (a).

d. $\text{NPV}=-1+\frac{1(1.09)}{1.10}=-0.009$. The correct discount rate is 10% because this is the appropriate rate for an investment with the level of risk inherent in the local restaurant. The NPV is negative because you will not earn enough to compensate for the risk.

You should invest in either the risk-free government securities or the risky stock market, depending on your tolerance for risk.

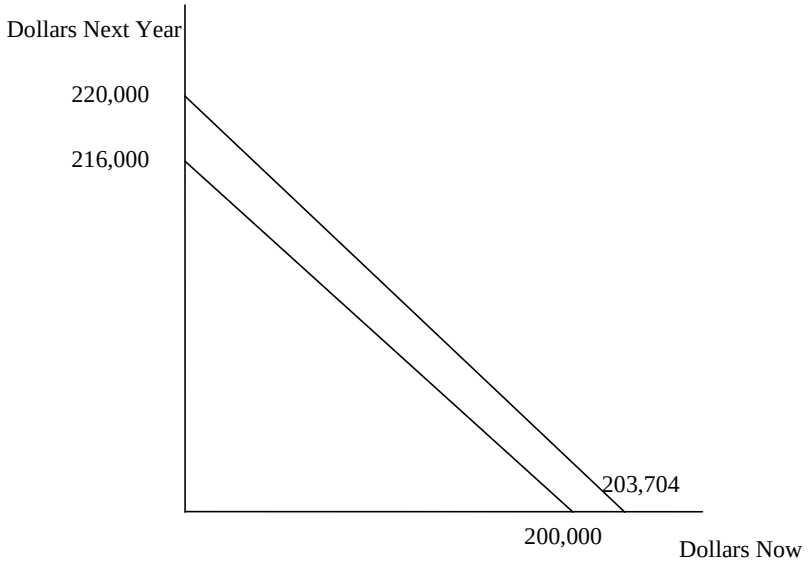
7. You borrow \$600,000 at 8%, which you invest them in the stock market and one the same time you invest \$1 million in the local winery. The total NPV of this investment strategy is equal to the sum of NPVs of the three transactions. This is given as:

$$\text{NPV}=\underbrace{0}_{\text{loan}}+\underbrace{0}_{\text{stock market}}+\underbrace{\left[-1,000,000+\frac{1,100,000}{1.12}\right]}_{\text{local winery}}=-\$17,857$$

Observe that taking a loan and invest the money in the stock market has a NPV equal to zero. Thus, this strategy does not create wealth. This can only be created

by investing in the local winery, but as we already know from exercise 6 this has a negative NPV equal to -$17,857. Thus, this is not a smart move.

8.



a. Let x = the amount that you should invest now. Then ($200,000 – x) is the amount you will consume now, and (1.08x) is the amount you will consume next year.
Since you want to consume exactly the same amount each period:

$$200{,}000 - x = 1.08x$$

Solving, we find that x = $96,153.85 so that you should invest $96,153.85 now, you should spend ($200,000 - $96,153.85) = $103,846.15 now, and you should spend (1.08 × $96,153.85) = $103,846.15 next year.

b. Since you can invest $200,000 at 10% risk-free, you can consume as much as ($200,000 × 1.10) = $220,000 next year. The present value of this $220,000 is: ($220,000/1.08) = $203,703.70
Therefore you can consume as much as $203,703.70 now by first investing $200,000 at 10% and then borrowing, at the 8% rate, against the $220,000 available next year. If we use the $203,703.70 as the available consumption now and again let x = the amount that you should invest now, we can then solve the following for x:

$$\$203{,}703.70 - x = 1.08x$$
$$x = \$97{,}934.47$$

Therefore, you should invest $97,934.47 now at 8%, you should spend ($203,703.70 – $97,934.47) = $105,769.23 now, and you should spend ($97,934.47 × 1.08) = $105,769.23 next year.
Note that this approach leads to the result that you borrow $203,703.70 at 8% and then invest $97,934.47 at 8%. We could simply say that you should borrow ($203,703.70 - $97,934.47) = $105,769.23 at 8% against the $220,000 available next year. This is the amount that you will consume now.

c. The NPV of the opportunity in (b) is: ($203,703.70 - $200,000) = $3,703.70