Lecture 4 – Time Value of Money

Question 1

NPV

Minnick Motors is considering beginning one of two mutually exclusive new project options with the following expected cash flows:

Year	Cash Flow (Option 1)	Cash Flow (Option 2)
0	$(900,000)	$(40,000)
1	$400,000	$35,000
2	$400,000	$50,000
3	$400,000	$65,000

Based on a calculation of the NPV for each option, which project should the firm choose to undertake? Assume the discount rate for both options is set at 10%.

a) Option 1; Option 1 has a higher NPV than Option 2, and is above 0.
b) Option 2; Option 2 has a higher NPV than Option 1, and is above 0.
c) Option 1; Option 1 has a lower NPV than Option 2, and is above 0.
d) Option 2; Option 2 has a lower NPV than Option 1, and is above 0.
e) Neither, both options have a negative NPV value.

Question 2

Compounding Interest

Leung Banking offers you an investment with two conditions attached. One, the cost of the investment is $5,000. Second, the investment pays out a sum *P* at the end of the first year. To try to keep up with inflation, this end-of-year payout increases by 9% each year for eight years, as given in the table below. If the discount rate is 10%, what is the smallest *P* that makes this investment worthwhile?

Year	Cash Flow

0	$(5,000)
1	*P*
2	P * 1.09
3	P * 1.09 * 1.09
…	…
9	$P * 1.09^8$

a) $390.90
b) $467.73
c) $633.71
d) $709.35
e) $2,000.00

Question 3

MARR

Determine the IRR for an investment opportunity presented to Garland Garages outlined below. If the discount rate is 7%, and the MARR is 10%, should this investment be accepted?

Year	Cash Flow
0	$(10,000)
1	$(500)
2	$400
3	$2,000
4	$2,000
5	$2,000
6	$10,000

a) The IRR is (closest to) 6.07%, so the investment should be declined.
b) The IRR is (closest to) 9.56%, so the investment should be accepted.
c) The IRR is (closest to) 7.11%, so the investment should be accepted.
d) The IRR is (closest to) 9.21%, so the investment should be declined.
e) The IRR is (closest to) 9.56%, so the investment should be declined.

Question 4

Effective Rate of Interest

Basem's Boating Supplies generates interest on the land value of the store at a nominal rate of 7.00% per year. Find the **effective rate of interest** if it were compounded quarterly.

A) 14.70%
B) 7.19%
C) 28.00%
D) 7.00%
E) 24.01%

Question 5

Cash Flows

Suppose a condo was purchased for $800,000. A $125,000 down payment was made and a mortgage was negotiated with the previous owner for the remaining balance. The previous owner would be paid $5,000 per month at 4.5% nominal interest, compounded monthly. How long would it take to pay back the mortgage?

Question 6

Interest Rates

The principal amount can also be referred to as:

a) The present value of money
b) The future value of money
c) The amount of money earned by the interest rate over time
d) The difference between the future value of money and present value of money
e) The consumer price index
f) The interest rate

Question 7

Compound Interest

Kate wants to buy a new car in two years from today. She expects that the price of a car will be $32,000 at that time. How much money should Kate put in a savings account today, if the bank will pay a 5% annual interest rate on this account?

a) $29,025
b) $35,280
c) $30,477
d) $28,800
e) $29,091
f) $27,766

Question 7.1

Simple Interest

Suppose that after the first year, Kate removes all of the interest that has accumulated, leaving only the principal amount. To still end up with $32,000 at the end of the second year, what would the principal amount need to be?

a) $29,025
b) $35,280

c) $30,477
d) $28,800
e) $29,091
f) $27,766

Question 7.2

Compound Interest

Over a 4-year period, the total *interest* paid on a loan is $476.50. If the interest rate was quoted as a nominal 4%, but compounded twice-yearly, what was the principal amount?

a) $2775.85
b) $2675.85
c) $2175.85
d) $2275.85
e) $2375.85

Question 8

Simple Interest

Your friend needed to pay a rent deposit to his landlord. You decided to lend him $1000. Being a good friend, you told him that you will charge him an annual interest rate of 4%, compounding annually. He said that money is tight right now, but he will pay you back in 3 years. He also promises that he will pay you the interest owed to you at the end of each year. Assuming that your friend will keep his promise, what will he pay you at the end of year 1, year 2 and year 3? What is the total interest that he will pay you?

a) Year 1: $30, Year 2: $30, Year 3: 1030, Total interest: $90
b) Year 1: $40, Year 2: $40, Year 3: 1000, Total interest: $80
c) Year 1: $0, Year 2: $0, Year 3: 1040, Total interest: $40
d) Year 1: $40, Year 2: $40, Year 3: 1040, Total interest: $120
e) Year 1: $390, Year 2: $390, Year 3: 340, Total interest: $120

Question 9

Effective and Interest Rates

Suppose that the nominal interest rate is 12% and interest is compounded semi-annually, What is the effective annual interest rate?

a) 12%
b) 12.36%
c) 12.68%
d) 12.75%
e) 12.89%

Question 10

Effective and Interest Rates

Your credit card statement says that your card charges only 0.5% interest per week. What is the actual effective interest rate per year?

a) 26%
b) 27.3%
c) 6.2%
d) 21.7%
e) 29.6%

Question 11

Compound Interest

How much will be in the bank account at the end of 12 years if $1000 is invested today at a nominal interest rate of 8% compounded semiannually?

a) $6341.18
b) $1601.03
c) $2563.30
d) $2518.17
e) $1960.00

Question 11.1

Effective Interest

What is the effective annual interest rate?

a) 8%
b) 8.16%
c) 8.24%
d) 8.30%
e) 8.37%
f) 8.43%

Question 12

Annuities

A Tesla Model 3 costs $55,000. It can be financed at 6.0% for 48 months, with monthly compounding. How much will the monthly payments be?

a) $1145.83
b) $1178.94
c) $1211.32
d) $1291.68
e) $1322.15

Question 12.1

What was the total interest paid on the Tesla Model 3?

a) $975.84
b) $1589.12
c) $3143.36
d) $7000.64
e) $8463.20

Question 13

Annuities

You have received an endowment that will pay you a series of 15 annual payments of $1000 each. The payments will be placed in a savings account that has a nominal annual interest rate of 5%, compounded monthly. You will receive the first payment now. What will be the amount in the savings account when you receive the final payment?

a) $17844.45
b) $19757.40
c) $20757.40
d) $21578.56
e) $21768.23

Question 13.1

Annuities

What is the present value of the endowment?

a) $9783.32
b) $10825.63
c) $11351.12
d) $13486.75
e) $14232.48

Question 14

Inflation

A university scholarship established 25 years ago was $10,000. It was increased this year to $20,000. If the average inflation rate over those 25 years was 3% per year, has the increase been enough to offset inflation?

a) Yes, the current dollar value of the new scholarship compared to 25 years ago is $20,000.
b) Yes, the real dollar value of the new scholarship compared to 25 years ago is $20,938.
c) Yes, the current dollar value of the scholarship from 25 years ago compared to now is $20,938.
d) No, the real dollar value of the scholarship from 25 years ago compared to now is $20,938.
e) No, the current dollar value of the new scholarship compared to 25 years ago is $9,552.