**CHAPTER 2**

**EXERCISE 2.1**

**Part A**

1.
2.
3.
4.
5.
6.
7.
8.
9. a)

b)

c)

1.
2. a)

b)

c)

d)

e)

1. a)

b)

1. a)

b)

c)

d)

1. At the end of 5 years

At the end of 6 years

Interest earned = $384.43

**EXERCISE 2.1**

**Part B**

1. a)

b) Period Interest

|  |  |
| --- | --- |
| January 1-June 30 |   |
| July 1 – December 31 |   |
| Total interest earned |   |

c) Period Interest

|  |  |
| --- | --- |
| January  |   |
| February |   |
| March |   |
| April |   |
| May |   |
| June |   |
| July |   |
| August |   |
| September |   |
| October |   |
| November |   |
| December |   |
| Total interest earned |   |

1.

Growth of $1000

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Years | *n* | *j*365 *=* 4% | *j*365*=* 7% | *j*365 *=* 10% |
| 510152025 | 18253650547573009125 | 1221.391491.791822.062225.442718.13 | 1419.022013.622857.364054.665753.63 | 1648.612717.914480.777387.0312 178.32  |

1.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *m* | *i* | *n* | *S* | Interest |
| 1241252365 | 0.0540.0270.01350.0045   | 1020401205203650 | 16 920.2217 037.6217 098.1917 139.2917 155.26 17 159.38  | 6920.227037.627098.197139.297155.267159.38 |

**EXERCISE 2.2**

**Part A**

1. a)

b)

c)

d)

e)

1. a)

b)

c)

d)

e)

1. a)

b)

c)

d)

e)

f)

g)

h)

1.
2.
3.

Thus yields the higher annual effective rate of interest.

1. a)

 BEST

 WORST

b)

 BEST

 WORST

1. Bank A :

Bank B :

.

**EXERCISE 2.2**

**Part B**

1. a)

|  |  |  |  |
| --- | --- | --- | --- |
| b) |   |  |  |
|  |   | 26 764.5126 878.3326 937.1026 977.0026 996.51 |

|  |  |  |  |
| --- | --- | --- | --- |
| c) |   |   |   |
|  | 0.0592634640.0597024750.060.060145294 | 26 764.5126 878.3326 937.1026 977.0026 996.51 |

1. a)

b)

c)

1. ;

 → →

1. a) -th year

-th year

b)–th year

 *-*th year

**EXERCISE 2.3**

**Part A**

1.
2. Maturity value

Proceeds

1. Maturity value

Proceeds

1. Discounted value of the payment plan :

66

The payment scheme is cheaper by

1. Total current value

**EXERCISE 2.3**

**Part B**

1. Maturity value

Financial Consultants pay:

Financial Consultants receive:

Financial Consultants profit:

1.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  | Discount  |
| 1241252365 | 0.060.030.015    | 51020602601825 | 1072.791068.241065.911064.341063.721063.57 | 362.84367.39369.72371.29371.91372.06 |

1. Net present value of proposal A :

Net present value of proposal B:

Select proposal A with higher net present value.

**EXERCISE 2.4**

**Part A**

1. a)

b)

1. a)

b)

1. a)

b)

1. a)

b)

1. Maturity date is October 20, 2019.

Time

1.
2.
3. Maturity date is December 8, 2017.

Time

1. Maturity date is August 24, 2015:

Proceeds:

Compound discount:

**EXERCISE 2.4**

**Part B**

1. a) From the binomial theorem

 The 3rd term in the series will overshadow all the remaining terms.

 If

 And

 If

 and

c) For

1.

1. Maturity value on October 4, 2018:

Proceeds:

Compound discount:

**EXERCISE 2.5**

**Part A**

1.

1.

1.

1.

1.

1.

1. a)

 Rule of 70

b)

 Rule of 70

1.

**EXERCISE 2.5**

**Part B**

1.

1.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 2% | 4% | 6% | 8% | 10% | 12% | 14% | 16% | 18% | 20% |
|  | 35 | 17.7 | 11.9 | 9 | 7.3 | 6.1 | 5.3 | 4.7 | 4.2 | 3.8 |
|  | 35 | 17.5 | 11.67 | 8.75 | 7 | 5.83 | 5 | 4.375 | 3.89 | 3.5 |

1.

1. → →
2.

 -years

1.

 Using simple interest for the last X days we obtain:

 This solves for *X* = 233; It takes 19 years and 233 days

1.

Using compound interest for 7 years and simple interest for X days we have

Solving for X we obtain X ≐ 128 days; It takes 7 years, 128 days

Check :

**EXERCISE 2.6**

**Part A**

1. a)

b)

Note: ­

1. a)

b)

c)

1. At the end of 4 years:

1. a) On December 1, 2015:

1. Balance on September 1, 2015:

1. At the end of 3 years:

1. At the time of the man’s death:

1. Maturity value of original debt:

Equation of value at time 5:

By trial and error,

|  |  |
| --- | --- |
| *i* = *j*4/4 | Right hand side |
| 0.02 | 949.72 |
| 0.015 | 984.85 |
| 0.013 | 999.33 |
| 0.0128 | 1000.80 |
| 0.0129 | 1000.06 |

Thus, *j*4 ≐ 4(0.0129) = 0.0516 = 5.16%

**EXERCISE 2.6**

**Part B**

1. a)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
| 0 |  |  |  |  |

Multiplying the first equation by we obtain

1. On January 1, 2018:

1. At the present time:

1. Let

­

**EXERCISE 2.7**

**Part A**

1.

1.

1. a)

The payment option is better.

b) Discounted value of the payments option:

The cash option is better.

1.

**EXERCISE 2.7**

**Part B**

1. Amount in the account on April 21, 2014 :

Calculate such that

By trial and error we determine:

at

at

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | amount |  |  |  |  |  |  |
|  |  | { |  | { | 3418.71 | 5% | } |  | } |  |   |
|  | 91.77 | 76.08 | 3494.79 |  |   | 1% |   |
|  |  |  |  | 3510.48 | 6% |  |  |  |   |

Check at

1.

1. Let

and

**EXERCISE 2.8**

**Part A**

1.

Increase

1. a)

b)

c)

**EXERCISE 2.8**

**Part B**

1. Let

You need U.S. dollars now in U.S. dollars account,

which is equivalent to

This amount invested in a Canadian dollar account will accumulate to

 The implied exchange rate one year from now is

1. Present value of due in *n-*years at annual effective rate is:

Present value of 1 due in years at annual effective rate is:

**EXERCISE 2.9**

**Part A**

1. Increase

1. *P* = 0.25 *S* = 10 *i* = 0.10

**EXERCISE 2.9**

**Part B**

1. a) Number of flies at 7 a.m.

 Number of flies at 11 a.m.

 Increase between 7 a.m. and 10 a.m.

b)

 At 0:47 a.m. there will be 20 000 flies in the lab.

Population in 2014 =

Population in 2019 =

 Increase in population

**EXERCISE 2.10**

**Part A**

1. a)

b)

c)

1. a)

b)

c)

1. a)

On November 8, 2020 the deposit will be worst at least $1200.

b)

On November 8, 2016 the deposit will be worth at least $1200.

1.

1. a)

b)

c)

She should accept offer c) as it has the lowest interest charges.

**EXERCISE 2.10**

**Part B**

1.

1. At the end of *t* -years :

1.

1. At the end of 12 months:

**REVIEW EXERCISE 2.11**

1.
2. a) Theoretical method :

 Practical method :

b) Theoretical method :

 Practical method :

1. Interest

1. Maturity date is November 21, 2018

Proceeds

1. Maturity Value of Loan =

On January 1, 2019:

1.

1. At the present time:

1. a) at

b) at

c) at

1. Discounted value of the payments option:

 Cash option is better by $1709.88

1. Maturity value on October 6, 2012:

Proceeds on January 16, 2014:

Compound discount

1.

1. a)

b)

c)

1. She will receive
2. a)

b)

1. Value on December 13, 2013:

1. a) Equation of value at 12 months:

b) Equation of value at 12 months:

1. a) At

1. At

1. At

1. At

Rule of 70

c)

d)

**Case Study I** – Payday Loans

1. Calculate *j*  such that:

1. If you are one week late, the penalty is 10% of 1000 or another $100.

Thus you borrow $800 and pay back $1100 in 21 days. Thus:

If you are two weeks late, you owe $1200 in 28 days. Thus:

1. When the fee is 15%:

At 20%:

At 30%

**Case Study II** – Overnight Rates