**CHAPTER 2**

**EXERCISE 2.1**

**Part A**

9. a)

b)

c)

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 |  |



Growth of $1000

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Years | *n* | *j*365 *=* 4% | *j*365*=* 7% | *j*365 *=* 10% |
| 5  10  15  20  25 | 1825  3650  5475  7300  9125 | 1221.39  1491.79  1822.06  2225.44  2718.13 | 1419.02  2013.62  2857.36  4054.66  5753.63 | 1648.61  2717.91  4480.77  7387.03  12 178.32 |



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *m* | *i* | *n* | *S* | Interest |
| 1  2  4  12  52  365 | 0.054  0.027  0.0135  0.0045 | 10  20  40  120  520  3650 | 16 920.22  17 037.62  17 098.19  17 139.29  17 155.26  17 159.38 | 6920.22  7037.62  7098.19  7139.29  7155.26  7159.38 |

**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)



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) |  |  |  |
|  |  | 26 764.51  26 878.33  26 937.10  26 977.00  26 996.51 |

|  |  |  |  |
| --- | --- | --- | --- |
| c) |  |  |  |
|  | 0.059263464  0.059702475  0.06  0.060145294 | 26 764.51  26 878.33  26 937.10  26 977.00  26 996.51 |

1. a)

b)

c)

1. ;

→ →

1. a) -th year

-th year

b)–th year

*-*th year

**EXERCISE 2.3**

**Part A**

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:



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  | Discount |
| 1  2  4  12  52  365 | 0.06  0.03  0.015 | 5  10  20  60  260  1825 | 1072.79  1068.24  1065.91  1064.34  1063.72  1063.57 | 362.84  367.39  369.72  371.29  371.91  372.06 |

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

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. Maturity value on October 4, 2018:

Proceeds:

Compound discount:

**EXERCISE 2.5**

**Part A**























1. a)

Rule of 70

b)

Rule of 70



**EXERCISE 2.5**

**Part B**







|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 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. → →

-years



Using simple interest for the last X days we obtain:

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



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. a)

The payment option is better.

b) Discounted value of the payments option:

The cash option is better.



**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. Let

and

**EXERCISE 2.8**

**Part A**



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. a)

b)

c)

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

**EXERCISE 2.10**

**Part B**



1. At the end of *t* -years :



1. At the end of 12 months:

**REVIEW EXERCISE 2.11**

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. 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. 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