**Notes**

1. Suppose we invest $100 in a bank account that pays 8% interest per year.
   1. Identify the independent and dependent variables.
   2. Write the exponential equation that models this situation.

**Compounding *n* Times per Year:**

1. Suppose we invest $100 in a bank account for one year that pays 8% interest per year. Write the equation if the interest is:
   1. Compounded Annually.
   2. Compounded Quarterly.
   3. Compounded n Times per Year.

**Vocabulary:** What is *e*?

**Value of** **as n Increases**

|  |  |  |
| --- | --- | --- |
| Compounding Period | *n*  (# of Compoundings per year) | Approximate value of    (write out all decimals) |
| Annually |  |  |
| Quarterly |  |  |
| Monthly |  |  |
| Daily |  |  |
| Hourly |  |  |
| Once a Minute |  |  |
| Once a Second |  |  |
| Continuously |  |  |

**Compounding Continuously:**

1. Construct an equation that describes the value of your investment at year *t* if you invest $1000 at 8.5% compounded at the compounding period given.

|  |  |  |
| --- | --- | --- |
| **Compounding period** | **Equation for the value after *t* years** | **Value after 5 years** |
| Annually |  |  |
| Quarterly |  |  |
| Continuously |  |  |

**In-Class/ Homework**

1. At birth, Maria’s parents set aside $8000 in an account designated to help pay for her college education. How much will Maria’s account be worth by her 18th birthday if the interest rate was 8% compounded continuously? Show your work.
2. You want to invest money for your newborn child so that she will have $50,000 for college on her 18th birthday. Determine how much you should invest if the best annual rate that you can get on an investment is 9% compounded daily? Show your work.
3. Wilson’s Financial Services handles all the investment accounts for FMP faculty. Some of the different accounts are described in the chart below.

For each account, select the correct general model (A, B, C, or D) from the given list **then** write the model using the information from the description.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

|  |  |  |
| --- | --- | --- |
| **Description** | **General Model**  **(A, B, C, or D)** | **Specific Model using Description (with numbers substituted in)** |
| John’s retirement account earns 3.5% compounded continuously. He started with $4000. |  |  |
| Sandy just opened a retirement account with $3000. It will earn a rate of 5.1% compounded monthly. |  |  |
| Mary Kay has a college fund for her grandson, Noah. She started the account with $500. It earns 6% annually. |  |  |
| Leslie set up an account for Bailey with $1000 that adds $20 each year. |  |  |

**Review**

1. When Queen Sandy took the throne of Xanadu, her advisers were concerned about population growth versus the food supply of their small country.

The population in millions, *P(t)*, of Queen Sandy’s country is given by the model: .

Her country’s annual food supply is described by the model: , where *F(t*) is the number of people in millions that can be fed and *t* represents the time in yearsQueen Sandy has been ruling Xanadu.

* 1. What was the population when Queen Sandy first took the throne?
  2. How many people could be fed when she was crowned?
  3. Identify and interpret the rate from the population model.
  4. Identify and interpret the slope from the food supply model.
  5. Will there be a food shortage? If so, how many years after her taking the throne. What will the population be at that time? Sketch a graph below to support your answer. Be sure to label the axes as well as any key points.

