**Compound Interest Worksheet**

Complete this worksheet in class. *No answers will be provided.* Please check your work with a friend, or the instructor. You will need to use a calculator for most of the questions.

**Question 0.1** *Simple interest is interest paid on the principal only. At the end of each term, you receive interest on your principal. Suppose that you invest 200$ with a bank promising 6% interest yearly. Complete the following table:*

| *Year* $n$ | *Value* $V(n)$ | *Difference* $V(n) - V(n-1)$ |
|---|---|---|
| *0* | *200* | *Undefined.* |
| *1* | | |
| *2* | | |
| *3* | | |

**Question 0.2** *Write a formula for the simple interest earned on $P$ dollars of principle, with annual interest rate $r$, over a term of $n$ years. Use your formula to determine the amount of money you need to invest so as to have $1000 in five years with an interest rate of % 2.*

**Question 0.3** *Compound interest is interest paid on the principal and all earned interest. Suppose you get a % 3 interest compounded annually on an investment of $100. Complete the following table:*

| *Year* $n$ | *Principal* $P(n)$ | *Difference* $P(n) - P(n-1)$ |
|---|---|---|
| *0* | *100* | *Undefined.* |
| *1* | | |
| *2* | | |
| *3* | | |

**Question 0.4** *Write a formula for the future value of $P$ dollars of principle, with annual interest rate $r$, over a term of $n$ years. Use your formula to determine the amount of money you need to invest now in order to have \$100,000 in 20 years with an interest rate of %2 compounded annually.*

**Question 0.5** *An annual percentage rate*[1] *is a compound interest rate which is subdivided and compounded at equally sized intervals. Consider an investment of 500\$ with a 3% annual percentage rate. Complete the following table:*

| *Compounded $t$ times* | | *Value at one year* |
|---|---|---|
| $t = 1$ | *Annually* | |
| $t = 2$ | *Semi-annually* | |
| $t = 4$ | *Quarterly* | |
| $t = 12$ | *Monthly* | |
| $t = 365$ | *Daily* | |
| $t =$ | *Hourly* | |
| $t =$ | *"Minute-ly"* | |

**Question 0.6** *Jacob Bernoulli (1655-1705) discovered the mathematical constant $e \simeq 2.71828$ by the following method: Determine the value of \$1 invested at 100% APR compounded at each instant in time for a period of one year. To follow in Bernoulli's (gigantic) footsteps: (i) write a formula for the value of \$P invested at rate $r$% APR compounded $t$ times, and (ii) let $t$ go to infinity.*

[1] There are many different interpretations of APR loans and investments. It's a mess.