BECA / IB Math 5 Exponential functions Name:
3 March 2022

5.7 Classwork: The natural base *e*

I can calculate continuous compounding CCSS.HSF.LE.A.2

$FV = PV \times \left(1 + \frac{r}{100k}\right)^{kn}$ where FV is the future value,

PV is the present value, n is the number of years,
k is the number of compounding periods per year,
r% is the nominal annual rate of interest

1. Do Now: A seven year investment of \$100,000 earns an annual interest rate of 8.25%.

   (a) Find the future value at maturity (after 7 years) with annual compounding.

   (b) Find the value at maturity with monthly compounding.

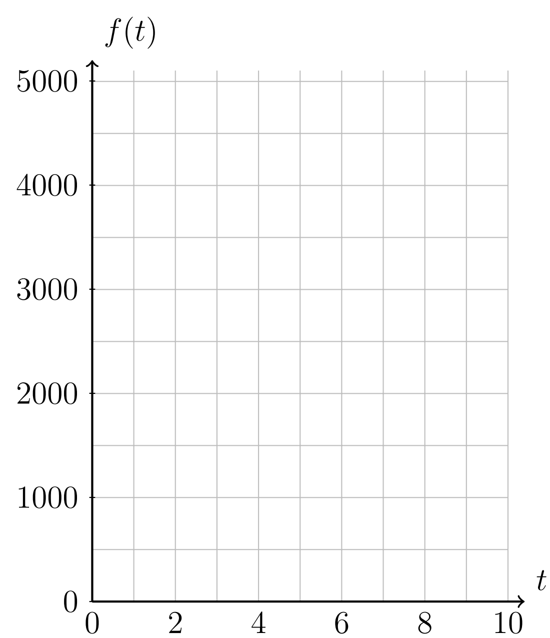
2. On the grid below draw the exponential function $f(t) = 1700 \times (1 + 0.095)^t$ representing the growth of an investment over t years.

   (a) Write down the initial value of the investment.

   (b) Write down the annual interest rate.

   (c) Find the value of the investment after ten years.

   (d) Find the number of years it takes the investment to double in value.



The natural base $e \approx 2.71828...$

3. Find each value using a calculator or computer

   (a) $e^{0.10} =$ (b) $e^{2} =$

4. The temperature of a hot iron as it cools is modeled by the function

$$T(x) = 350e^{-0.035x} + 18$$

where $T(x)$ is the temperature in degrees Celsius and x is the time in minutes.

   (a) Write down the initial temperature at time zero.

   (b) Find the temperature after 20 minutes.

   (c) When will the temperature of the iron reach 75 degrees Celsius?

   (d) On the graph below, sketch the temperature of the iron, labeling the points above A, B, and C.