Math 321   JANUARY 8 CLASS EXERCISES   Winter 2018

1. Find the derivative of each function without using your calculator. You *MAY* use the course formula sheet. Give your answers using correct derivative notation.

   (a) $y = 2\sin 3x$

   (b) $y = 4e^{-0.5t}$

   (c) $x = t^2 + 5t - 4$

   (d) $y = 3.4\cos(1.3t - 0.9)$

   (e) $y = te^{-3t}$

   (f) $x = 4e^{-2t}\sin(3t + 5)$

2. Find the second derivatives of the functions from parts (a)-(c) of Exercise 1. Give your answers using correct derivative notation.

3. The height y of a mass on a spring, from its equilibrium point, is measured in inches. Time t is in seconds, and we are given that

$$\frac{dy}{dt}\bigg|_{t=3} = 1.87$$

(a) What are the units of the number 3? What quantity does t measure?

(b) What are the units of the number 1.87? What physical quantity is it representing?

(c) Write a sentence summarizing the given mathematical statement. *DO NOT* use the word *derivative*, *DO* use one of the words *upward* or *downward*.

4. The temperature T, in degrees Fahrenheit, of a burrito when it comes out of a microwave oven is $134°$ F. It's too hot to eat, so you let it cool for a bit. Suppose that time t is measured in minutes and we have

$$\frac{dT}{dt}\bigg|_{t=5} = -2.3$$

Write a sentence summarizing what this tells us. Include (correct!) units with any numbers. *DO NOT* use the words *derivative*, *negative*, or the negative sign. *DO* use one of the words *increasing* or *decreasing*.

5. The temperature T, in degrees Fahrenheit, of a burrito when it comes out of a microwave oven is $134°$ F. It's too hot to eat, so you let it cool for a bit in a $68°$ F room. You start playing a video game and forget about the burrito until several hours later. Sketch a graph of the temperature of the burrito as a function of time. Label two numerical values on the vertical (T) axis.