Math 1a. Precalculus Worksheet.

Fall 2005

1. Some friends are taking a long car trip. They are traveling east on Route 66 from Flagstaff, AZ through New Mexico and Texas into Oklahoma.

   - Let f be the function that gives the number of miles traveled t hours into the trip, where $t = 0$ denotes the beginning of the trip. For example, $f(7)$ is the distance traveled seven hours into the trip.
   - Let g be the function that gives the car's speed t hours into the trip, where $t = 0$ indicates the time at the beginning of the trip. For example, $g(7)$ is the speed of the car seven hours into the trip.

   Suppose that the car passes a sign that reads "Entering Gallup, New Mexico," h hours into the trip. Write the following expressions using functional notation wherever appropriate.

   (a) The car's speed one hour before entering Gallup.

   (b) 10 miles an hour slower than the speed of the car entering Gallup.

   (c) Half the time that it took to reach Gallup.

   (d) The speed of the car 6 hours after reaching Gallup.

   (e) The distance traveled in the first two hours of the trip.

   (f) The distance traveled in the second two hours of the trip.

   (g) The distance traveled in the second three hours of the trip.

   (h) The average speed traveled in the first five hours of travel.

   (i) The average speed between hour 6 and hour twelve of the trip.

2. Using Problem 1 Interpret the following in words.

   (a) $f(h+2)$

   (b) $\frac{1}{2}f(h)$

   (c) $f\left(\frac{1}{2}h\right)$

   (d) $f(h-2)$

   (e) $f(h)-2$

   (f) $f(h)+2$

   (g) $g(h+2)$

   (h) $g(h)+2$

   (i) $g(h)-2$

   (j) $\frac{1}{2}g(h)$

   (k) $\frac{1}{2}g(h-1)$

3. A certain menacing biological culture (aka The Blob) grows at a rate proportional to its size. When it arrived unnoticed one Wednesday noon in Chicago's Loop, it weighed just 1 g. By 4:00 p.m. rush hour, it weighed 4 g. The Blob has its "eye" on the Sears Tower, a tasty morsel weighing 3,000,000,000,000 g (i.e. 3×10^{12} g). As soon as it weighs 1000 times as much (i.e. 3×10^{15} g), The Blob intends to *eat* the Sears Tower. By what time must The Blob be stopped? Will Friday's rush-hour commuters be delayed?

4. The Bay of Fundy in Canada has the highest tides in the world. The tidal range (that is, the difference between between low and high tides) is 16 meters. There are two high tides every 24.8 hours. We can use this information to model the height h of the water (in meters above sea level) as a function of time t (in hours since midnight on a particular day) by the function

$$h(t) = A\cos(Bt) + C.$$

   (a) What should the value of A be?

   (b) What should the value of B be?

   (c) What is the physical meaning of C?