Read: Sections 17.1 and 17.2 Do: 17.1 #3, 17.2 # 2, 6, 7 plus the problems below. **Interpreting Deriva-**

tives

1. Hikers have observed that at around 2000 feet above sea level, for every 300 feet of altitude gained the temperature drops by 1 degree Fahrenheit. Write an equation that reflects this statement.

2. Suppose that one's general state of happiness on a given day can be expressed in "happiness units" where 0 is the minimum state of happiness and 10 is the maximum. In real life one's happiness on any given day depends upon many factors. Let's consider just a few:

   - s = the number of hours of sleep gotten on the given day.
   - w = the number of hours of work done on the given day.
   - e = the number of hours of exercise gotten on the given day.
   - L = the number of hours of sunlight on the given day.

   Let h represent the happiness level on a given day. In the questions below assume that one and only one of the factors contributing to happiness is changing while the others are held constant.

   (a) Do you expect $\frac{dh}{ds}$ to be positive, negative, or zero when $s = 3$?

   (b) Do you expect $\frac{dh}{dw}$ to be positive, negative, or zero when $w = 19$?

   (c) Which do you expect to be larger, $\frac{dh}{ds}$ evaluated at $s = 2$ or evaluated at $s = 12$?

   (d) Interpret: $\frac{dh}{dw}|_{e=5} < 0$ if $s = 2$.

   (e) Interpret: For a person with SAD, seasonal affective disorder, $\frac{dh}{dL} > 0$.

3. Air is being pumped into a spherical balloon at a rate of 5 cubic inches per minute. Let V be the volume of the balloon.

   (a) Translate the statement into a mathematical equation.

   (b) What is the relationship between the volume and the radius of the balloon. Does this relationship always hold?

   (c) *Exploratory:* How fast is the radius changing when the radius is 4 inches? 5 inches? r inches? (If a problem is labeled "exploratory" then you get full credit for an honest attempt regardless of whether or not your answer is correct.)

Problem Set #2 (tentative)

Read: Section 17.3 Do: 17.3 #5, 8, 9, 12(d)(e)(g) and 17.4 #1,3   Problem Set #3 (tenta

Read: Section 17.4 Do: 17.4 #6, 11, 12, 14