Math 1a. §2.4. Continuity. Worksheet

Fall 2005

1. Which of the following functions are continuous?

   (a) The temperature at a specific location as a function of time.

   (b) The temperature at specific location as a function of the distance due west of New York City.

   (c) The altitude above sea level as a function of distance due west of New York City.

   (d) The cost of a taxi ride as a function of the distance traveled.

   (e) The current in a circuit for the lights in a room as a function of time.

2. For what value(s) of c is

$$f(x) = \begin{cases} cx^2 + 2x & \text{if } x < 2 \\ x^3 - cx & \text{if } x \geq 2 \end{cases}$$

   continuous?

3. A monk leaves the monastery at 7:00 AM and takes his usual path to the top of the mountain, arriving at 7:00 PM. The following morning, he starts at 7:00 AM at the top and takes the same path back to the monastery, arriving at 7:00 PM. Is there a point on the path that the monk will cross at exactly the same time of day on both days? Why or why not.

4. Use the Intermediate Value Theorem to show that $x^4 + x = 3$ has a root in the interval $(1, 2)$.