1. Sketch the graph of a function that satisfies all of the given conditions:

- f is continuous except at $x = -2, 0, 2$
- the domain of f is $(-\infty, \infty)$
- f is odd
- $f(3) = 3$
- $\lim_{x \to 0^+} = 2$
- $\lim_{x \to 2^-} f(x) = \infty$
- $\lim_{x \to 2^+} f(x) = -\infty$

2. *A challenge problem, but reasonable. It follows from the Intermediate Value Theorem. Start by sketching elevation versus time for each day, one on top of the other.*

A Tibetan monk leaves the monastery at 7:00 AM and takes his usual path to the top of the mountain, arriving at 7:00 PM. He sleeps the night on top. The next morning he starts at 7:00 AM at the top and takes the same path back, arriving at the monastery at 7:00 PM. Show that there is a point on the path that the monk will cross at exactly the same time of day on both days.

3. Show that f is continuous on $(-\infty, \infty)$, and sketch the graph:

$$f(x) = \begin{cases} \sin x & \text{if } x < \pi/4 \\ \cos x & \text{if } x \geq \pi/4 \end{cases}$$

4. Prove that the equation has at least one real root:

$$\ln x = 3 - 2x$$

(*A calculator can help find an accurate approximation, but this is not required!*)

5. For what values of the constant c is the function f continuous on $(-\infty, \infty)$?

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