Name: **Tutorial time:**

1. A woman throws a stick into a lake for her dog to fetch; the stick is 15 feet down the shore line and 30 feet into the water from there. The dog may jump directly into the water and swim, or run along the shoreline to get closer to the stick before swimming. The dog runs about 22 ft/s and swims about 1.5 ft/s.

   How far along the shore should the dog run to minimize the time it takes to get to the stick?

2. Use a linear approximation (differential) to estimate the value of $\sqrt[3]{8.06}$.

3. Let $f(x) = \ln(x+1)$.

   (a) Calculate the degree 4 Taylor polynomial of f about $a = 0$.

   (b) Use your answer in part (a) to estimate the value of $\ln(2)$.

   (c) What is the error in your estimate? (Check with a calculator.) How many terms would you need to take to have an error less than 0.1?