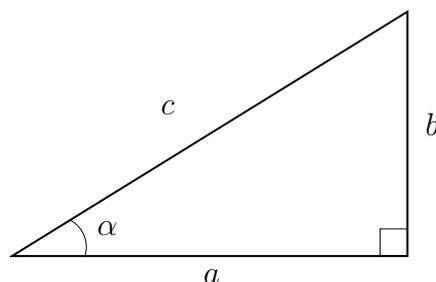


Scientific Programming Homework 1: Due 8/31

Practice problems (not to be turned in) Chapter 1 in the book: 4, 6, 10, 12, 14, 16, 26 and (Answers are in the back of the book)

Homework problems Do not just turn in the answers to the following problems, show the exact Matlab commands you used to find the answer.

1. The right angled triangle shown has $a = 20$ and $b = 5$. Define a and b as variables and then:



- (a) Use the Pythagorean Theorem to calculate c . (c can be calculated with a single line in Matlab.)
 - (b) Use the `acos` and `acosd` commands to find the angle α in radians and degrees, respectively.
2. The magnitude of an earthquake on the Richter scale is calculated by the formula $M = \frac{2}{3} \log_{10} \left(\frac{E}{E_0} \right)$, where E is the energy released by the earthquake and $E_0 = 10^{4.4}$ Joules is the energy of a small reference earthquake. The great San Francisco earthquake in 1906 was a 7.9 magnitude quake, the New Madrid earthquake in 1811 (which changed the course of the Mississippi) was measured as an 8.3 magnitude, and the Wabash Valley earthquake in April 2008 that you could feel in St. Louis was a 5.4.
 - (a) How many times more energy was released by the New Madrid quake than the Wabash Valley Quake?
 - (b) What would an earthquake that released ten times the energy of the San Francisco quake register on the Richter scale?
 3. An object with an initial temperature T_O is placed at time $t = 0$ inside a room with constant temperature T_A . Newton's Law of Cooling states that the temperature of the object at time t is given by the equation $T = T_A + (T_O - T_A)e^{-kt}$ for some constant k .

Suppose that a candy bar that was sitting in a refrigerator ($40^\circ F$) is placed in a hot car ($130^\circ F$). After 5 minutes, the candy bar's temperature has reached $98^\circ F$. What will the candy bar's temperature be after 15 minutes? (Hint: first define the variables, then find k , then find the temperature after 15 minutes.)