Matlab Exercises

1. Area Calculation: At Del Grosso Pizza Restaurant, all of our pizzas have a 2-cm wide pizza crust around them. We sell pizzas in all sizes, from 6 cm to 40 cm. In Matlab, make a plot showing the percentage of pizza area that is crust for all size pizzas.
   1. Key info: Area of a circle = **pi \* radius²**
2. Spike Histogram: In a neuronal electrophysiology experiment, the researcher wanted to know whether a neuron spiked more often at specific times following a stimulus. The file spikedata.mat contains two arrays: “spiketimes”: the times that the neuron spiked (in seconds), and “stimtimes” the times that the stimulus was presented. In Matlab, make a histogram showing how often a spike occurred up to 1 second before and 4 seconds after the stimulus appeared.
3. Oscillatory Interference Model: Two signals are oscillating, and our machine adds the two together when it detects them both. Write a Matlab function that plots how the added-together signal will look when the two signals are moving at given frequencies and with different time delays, so we can explore their effects on the measured signal.
   1. Key info: Signal = sin( freq \* time + delay);
   2. Key info: function **oscInterference( freq1, freq2, delay1, delay2)**
4. Population Statistics: The expression level of c-fos was measured in pyramidal cells from two types of animals: one expressing Alzheimers (‘**a**’), and a wild type (‘**b**’). These expression levels for each animal was stored in alzheimerStudy.mat. Do a t-test to find if the expression levels were significantly different in the two conditions.
5. Typing Tutor: Write a game that tells you how fast your typing is! This script should give you a sentence to input, then tell you how many seconds it took for the player to type it in. If the sentence is not exactly correct, it should tell the player that they were wrong, and make a beeping sound!