

```

# -*- coding: utf-8 -*-
"""
Created on Sun Apr 10 14:05:03 2022

@author: Benjamin
"""

#%% Assignment 5 - Q2
import numpy as np

#%% A
def roachNeurons(r0, n, ai, a):
    # The inputs of the code:
    #     r0 - baseline firing rate
    #     n - number of interneurons
    #     ai - vector of the preferred angle  $\alpha$  of each neuron
    #     a - real angle
    # The output of the code:
    #     a_hat - the prediction of the neurons using population vector
    neurons = [np.maximum(r0*np.cos(a-ai[i]),0) for i in range(n)] # firing rate per neuron
    x_hat = np.sum(neurons*np.sin(ai)/r0) # decode x direction
    y_hat = np.sum(neurons*np.cos(ai)/r0) # decode y direction
    a_hat = np.arctan2(x_hat, y_hat) % (2*np.pi) # vector to angle

    return a_hat

```