

MATH.2720 Introduction to Programming with MATLAB
Programming Structures – Examples to Work on Together in Class

1. The Saffir-Simpson Hurricane Wind Scale assigns hurricanes to categories based on wind speed according to the following table:

Wind Speed (mph)	Category
74 - 95	1
96 - 110	2
111 - 129	3
130 - 156	4
≥ 157	5

Write a script file that asks the user to enter the wind speed and prints the hurricane category.

2. The discrete logistic equation is $x_{n+1} = rx_n(1 - x_n)$. Given an initial value x_0 , the logistic equation can be used to calculate x_1, x_2, x_3, \dots . If $0 \leq r \leq 4$ and $0 \leq x_0 \leq 1$, all terms in the sequence will lie in the interval $[0, 1]$.

Write a script file that asks the user for the value of r , the initial value x_0 , and the number of terms to be computed. The script file should then calculate the terms in the sequence and plot them using asterisks as markers.

3. (From Gilat, *MATLAB: An Introduction with Applications*)

The following are formulas for calculating the training heart rate (THR) for men and women.

For men (Karvonen formula): $THR = [220 - AGE - RHR] \times INTEN + RHR$

For women: $THR = [206 - 0.88 \times AGE - RHR] \times INTEN + RHR$

where AGE is the persons age, RHR the resting heart rate, and $INTEN$ the fitness level (0.55 for low, 0.65 for medium, and 0.8 for high fitness). Write a program in a script file that determines the THR. The program asks users to enter their gender (male or female), age (number), resting heart rate (number), and fitness level (low, medium, or high). The program then displays the training heart rate. Use the program for determining the training heart rate for the following two individuals:

- (a) A 21-year-old male, resting heart rate of 62, and low fitness level.
- (b) A 19-year-old female, resting heart rate of 67, and high fitness level.

4. (From Attaway, *MATLAB: A Practical Introduction to Programming and Problem Solving*)

The reciprocal of the constant e can be approximated as follows: $\frac{1}{e} \approx \left(1 - \frac{1}{n}\right)^n$

Write a script that will loop through values of n until the difference between the approximation and the actual value is less than 0.0001. The script should then print out the built-in value of e^{-1} , the approximation to four decimal places, and the value of n required for such accuracy.