

MATH.2720 Introduction to Programming with MATLAB Exam # 2
Spring 2018

Due April 6. Please email your five script and function files to `stephen_pennell@uml.edu`

Problem 1. (20 points)

Write a script file that will graph the surface given by $z = \sqrt{9 - x^2 - y^2}$ for $-1 \leq x \leq 1$, $-2 \leq y \leq 2$.

Problem 2. (20 points)

Write a function file (**not a script file**) that takes a positive number x and a number $a > 1$ as input and produces the value of $\log_a(x)$ as output. Your code should check whether x is positive and whether a is greater than 1. If not, the function should produce the MATLAB value NaN as output. (This stands for Not a Number.) **No output should be displayed within your function file.**

Hint: $\log_a(x) = \frac{\ln(x)}{\ln(a)}$.

Problem 3. (20 points)

Write a function file (**not a script file**) that takes a nonnegative integer N as input and produces two outputs: the number $S = \sum_{n=1}^N \frac{1}{n^2} = 1 + \frac{1}{4} + \frac{1}{9} + \cdots + \frac{1}{N^2}$ and the number

$D = \left| S - \frac{\pi^2}{6} \right|$. **No output should be displayed within your function file.**

Problem 4. (20 points)

Write a script file (**not a function file**) that asks the user to enter his/her annual income (x) and then calculates the income tax owed (t) according to the following formula:

$$t = \begin{cases} 0 & \text{if } x \leq 20000 \\ 0.1(x - 20000) & \text{if } 20000 \leq x \leq 50000 \\ 3000 + 0.2(x - 50000) & \text{otherwise} \end{cases}$$

For example, if $x = 45000$ then $t = 0.1(45000 - 20000) = 0.1(25000) = 2500$.

Problem 5. 20 pts.

Write a function file (**not a script file**) that takes 2 inputs: a number T representing a temperature and a character S representing the scale of the temperature T . S can have the value 'C' (for Celsius), 'F' (for Fahrenheit), or 'R' (for Rankine). The function should convert T to Kelvin and output this value.