

Problem Set 4

Use Matlab to calculate the answers to the following:

Problem 1

Write a user-defined MATLAB function for the following math function:

$$y(x) = (-0.2x^3 + 7x^2) e^{-0.3x}$$

The input to the function is x and the output is y . Write the function such that x can be a vector or (use element-by-element operations). Use the function to calculate $y(-1.5)$ and $y(5)$

Problem 2

The fuel consumption of an airplane is measured in gal/mi (gallons per mile) or and L/km (liters per kilometer). Write a Matlab user defined function that converts fuel efficiency consumptions from gallons per mile to liters per kilometer. For the function name in arguments use ***Lkm=lkmToGalM(gmi)***. The input argument gmi is the consumption and gal/mi, and the output argument Lkm if the consumption in L/km. Use the function in the command window to:

- Determine the fuel consumption in liters per kilometer of a Boeing 747 whose you consumption is about 5 gallons per mile.
- Determine the fuel consumption in liters per kilometer of the Concorde whose fuel consumption is about 5.8 gallons per mile

Problem 3

The body surface area (BSA) and m^2 of a person (used for determining dosages of medication) can be calculated by the formula (Du Bois formula):

$$BSA = 0.007184W^{0.325}H^{0.75}$$

in which W is the mass in kilograms and H is the height in centimeters.

Write a MATLAB user-defined function that calculates the body surface area. For the function name and arguments, use ***BSA = BodySurA(w,h)***. The input arguments w and h are the mass in height, respectively. The output argument ***BSA*** is the BSA value. Use the function to calculate the body surface area of

- A 95 kg, 1.87m person
- A 61 kg, 1.58m person

Problem 4

The value B of a principal P that is deposited in a savings account with a fixed annual interest rate r after n years. The can be calculated by the formula:

$$B = P \left(1 + \frac{r}{m} \right)^{nm}$$

where m is the number of times that the interest is compounded annually. Consider an \$80,000 for 5 years. Determine how much more money will be earned if the interest is compounded daily instead of yearly. Write a user-defined function to calculate B .

Problem 5

Stirling's approximation for large factorials is given by:

$$n! = \sqrt{2\pi n} \left(\frac{n}{e} \right)^n$$

Use the formula for calculating $20!$. Write a user-defined function to compare the result of Stirling's formula with the true value obtained with MATLAB's built-in function *factorial* by calculating the error ($Error = (TrueVal - ApproxVal)/TrueVal$). The function should return the Error. Use n as the input to the function.