Eng 004 : An Introduction to Programming and Algorithms Handout #1

1. Use Matlab to check the validity of the following of arguments.

a.)
$$\pi \approx \frac{\ln(640320^3 + 744)}{\sqrt{163}}$$

b.) $\pi \approx \frac{63}{25} \times \frac{17 + 15\sqrt{5}}{7 + 15\sqrt{5}}$
c.) $e^{ix} = \cos x + i \sin x$ and $e^{i\pi} + 1 = 0$
d.) $n! \approx \sqrt{2\pi n} \left(\frac{n}{e}\right)^n$ (For large values of n)
e.) $\sin(x) = \operatorname{Im}(e^{ix})$
f.) $\cos(x) = \operatorname{Re}(e^{ix})$

2. Use the following series to obtain the values of sin(x), cos(x) and e. (Use upto 3 terms)

a.)
$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots = \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+1}}{(2n+1)!}$$

b.) $\cos(x) = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots = \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n}}{(2n)!}$
c.) $e = \frac{1}{0!} + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \dots = \sum_{n=0}^{\infty} \frac{1}{n!}$

3. Write simple matlab routines to obtain;

a.) The number of workers needed to complete a task within a specified time frame. (The number of workers required to complete this task in terms of men/hours will be provided by the user.)

- The program will ask for the number of workers required to complete this task in terms of men/hours.
- The program will ask for the specified time frame in term of hours.
- The program will calculate the number of workers needed and display it in the following format.
 "You need workers to complete this task"

b.) The number of items that can be handled by a specified number of employees within a specified time frame. (The number of items that can be handled by an employee per hour will be provided by the user.)

- The program will ask for the number of items that can be handled by an employee per hour.
- The program will ask for the specified time frame in term of hours.
- The program will ask for the number of employees assigned to handling.
- The program will calculate the number of items that can be handled and display it in the following format.

"You can get ... items handled"