MAT 116E Advanced Scientific and Engineering Computing

Lab-6

Q-1.

a. In what follows, the value p_n should approach π. Let $p_2 = 2\sqrt{2}$, and

$$p_{n+1} = 2^n \sqrt{2\left(1 - \sqrt{1 - \left(\frac{p_n}{2^n}\right)^2}\right)}$$

Compute p_n for $n = 3,4,\ldots,20$ by the above formula. Plot the absolute error versus n graph.

b. Define a 1x15 vector by using randi command in the interval [-100,100]. Find the harmonic average of the positive numbers. If no positive numbers exist, set harmonic average as 0.

$$Harmonic\ average = \frac{n}{\frac{1}{pnum_1} + \frac{1}{pnum_2} + \cdots + \frac{1}{pnum_n}}$$

Q-2. The electricity accounts of residents in a very small town are calculated as follows:

- if 500 units or less are used the cost is 2 cents per unit.
- if more than 500, but not more than 1000 units are used, the cost is $10 for the first 500 units, and then 5 cents for every unit in excess of 500
- if more than 1000 units are used , the cost is $35 for the first 1000 units plus 10 cents for every unit in excess of 1000.
- in addition, a basic service fee of $5 is charged, no matter how much electricity used.

Write a program which enters the following five consumptions into a vector, and uses a for loop to calculate and display the total charge for each one: 200, 500, 700, 1000, 1500.

($1=100 cents)