CS1112 Discussion Exercise 3

1 Multiples of k

The following program reads an integer k and outputs all the multiples of k up to 1000. Fill in the blank.

```
k = input('Please enter a positive integer smaller than 1000:  ');

for j = ______________________
   fprintf('%d ', j);
end
fprintf('\n');
```

2 Approximate square root (again!)

The square root of a positive value A can be computed by building "increasingly square" rectangles with area A. Write a script to solicit a positive value A and an a positive integer N. Then compute $\sqrt{A}$ by building N increasingly square rectangles. Let the first rectangle have length A and width 1. The final square root value is the average of the length and width of the Nth rectangle.

Do not use arrays, i.e., you will use scalar variables `L` and `W` for the length and width of a rectangle, respectively.

3 Approximate π

[Modified from *Insight* Exercise P2.1.5] For large n,

$$T_n = 1 + \frac{1}{2^2} + \cdots + \frac{1}{n^2} = \sum_{k=1}^{n} \frac{1}{k^2} \approx \frac{\pi^2}{6}$$

$$R_n = 1 - \frac{1}{3} + \cdots + \frac{(-1)^{n+1}}{2n-1} = \sum_{k=1}^{n} \frac{(-1)^{k+1}}{2k-1} \approx \frac{\pi}{4}$$

giving two different ways to estimate π:

$$\begin{aligned} \tau_n &= \sqrt{6T_n} \\ \rho_n &= 4R_n \end{aligned}$$

Write a script that displays the value of $|\pi - \rho_n|$ and $|\pi - \tau_n|$ for $n = 100, 200, \ldots, 1000$ in one table. Do not use arrays.