

## 1 Which quadrant? (re-visited)

[Last week's challenge question] Write a script using *nested* conditional statements *without* `elseif` to determine in which quadrant a user-input value of  $A$  degrees belongs. Assume that the user may enter any non-negative number. For example,  $725^\circ$  is the same, and should be treated, as  $5^\circ$ . (Hint: the function `rem` that you saw last week might be useful.) To avoid ambiguity, we use the following convention:

$$\text{Quadrant is } \begin{cases} 1 & \text{if } 0 \leq A < 90 \\ 2 & \text{if } 90 \leq A < 180 \\ 3 & \text{if } 180 \leq A < 270 \\ 4 & \text{if } 270 \leq A < 360 \end{cases}$$

## 2 Approximate $\pi$

[Modified from FVL 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  $\pi$ :

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

Write a script that displays the value of  $|\pi - \rho_n|$  and  $|\pi - \tau_n|$  for  $n = 100 : 100 : 1000$  in one table.

## 3 Divisors

Write a script to print all the numbers between 1 and  $n$ , exclusive, that divide  $n$  (without a remainder using integer division).  $n$  is a user input positive integer. (Hint: Remember function `rem`?)

### Optional Challenge Question

Refer to Question 3 and write a script to print the *prime numbers* that divide  $n$ . Do not use any built-in functions other than `rem`.