

(20 Marks)

Q1 Create a function that will take a number and flip its last N digits. For eg:

$\text{flip}(123, 2) = 132$

$\text{flip}(12345, 3) = 12543$

Verify that  $\text{flip}(\text{flip}(N,k),k) = N$

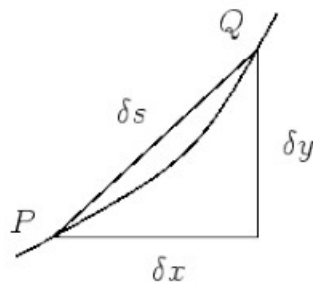
(30 Marks)

Q2 Create a C function for primality test. Use this function to find the smallest prime, larger than a number N. For example, if the input is 24 the closest prime larger than this number is 29.

Use these functions to create another function that will print the series of first M prime numbers. Test your program with values of  $M > 10$ .

(50 Marks)

Q3 In order to find the length of a (continuous) curve, we use a straight line approximation.



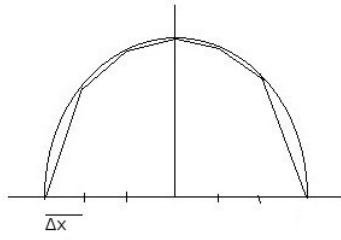
The obvious approach is to use the length of the chord PQ as an approximation to the length of the graph between P and Q. For the above figure, the length is:

$$\sqrt{\delta x^2 + \delta y^2}$$

Assume that you are provided with the equation of the curve (semi-circle) as follows:

$$y = \sqrt{r^2 - x^2}$$

Create a function to approximate the length of this curve in the range  $[-r, r]$ . Divide the curve into smaller elements of uniform width  $\Delta x$  (parameter to function) starting from  $x = -r$  to  $x = r$  as shown in figure below.



Find the lengths each of the smaller curve elements and add them.  
Then compare it with your knowledge of the length of a semi-circle. Also, observe the effect of width  $\Delta x$  on length of curve obtained.