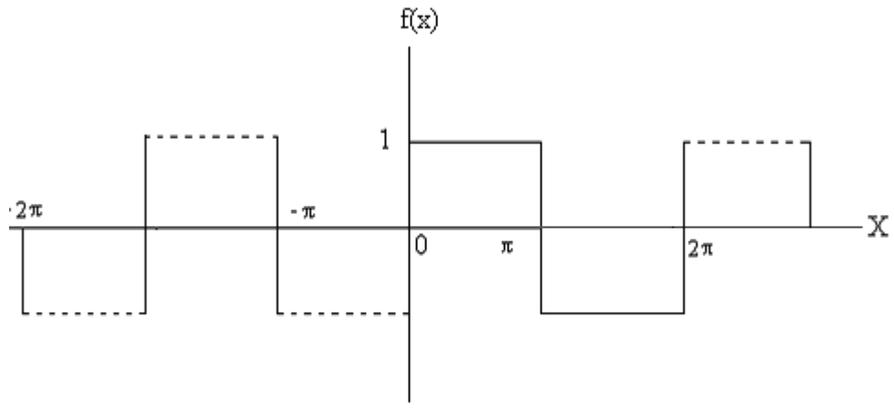
a.)

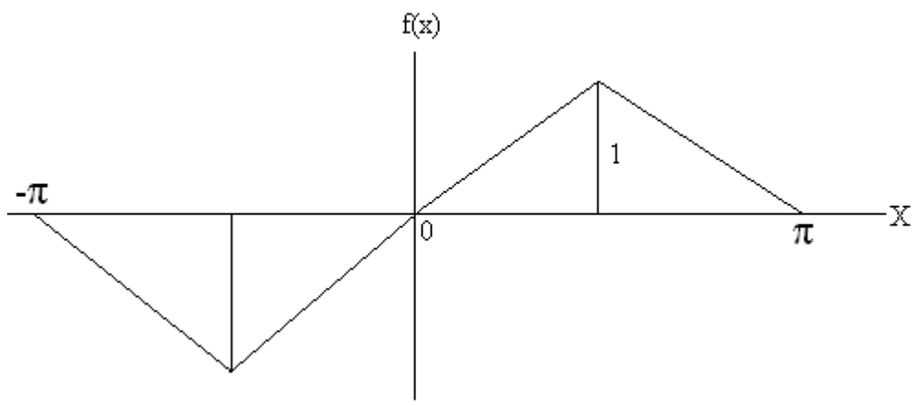


It can be shown that above periodic function can be written as,

$$f(x) = (4/\pi)\,[\sin x + (\sin 3x)/3 + (\sin 5x)/5 + \ldots\ldots]$$

Test the validity of the above expression by plotting $(4/\pi)\,[\sin x + (\sin 3x)/3 + (\sin 5x)/5 \ldots\ldots\ldots\ldots\ldots\ldots\ldots..]$, vs. x from x=0 to x=2π.

b.)



It can be shown that above periodic function can be written as

$$f(x) = (8/\pi^2)\,[\text{Sin } x - (\text{Sin } 3x)/3^2 + (\text{Sin } 5x)/5^2 - (\text{Sin } 7x)/7^2 + \ldots\ldots]$$

Test the validity of the above expression by plotting $(8/\pi^2)\text{Sin } x$, $(8/\pi^2)\,[\text{Sin } x - (\text{Sin } 3x)/3^2]$, etc.

c.)

A,B,C……N are nine points on a circle that makes a regular polygon. Coordinates of the center of the circle is (1,1) and its radius is 8. P(5,5) is a point inside the polygon while Q(20,20) is point outside the polygon.

a. Compute the coordinates of vertices of the polygon using the ***Table*** command in ***Mathematica.*** P(5,5) is a point inside the polygon while Q(20,20) is point outside the polygon.

b. Compute the distances AP, BP, CP……NP and AQ, BQ, CQ……NQ. Also determine sum of AP, BP, CP……NP and the sum of AQ, BQ, CQ……NQ. You may use ***Apply, Plus*** commands in ***Mathematica*** in the example given below.

c. Compute the angles that the consecutive vertices subtend at point P.

d. Compute the sum of the angles mentioned above in c.

e. Compute the angles that the consecutive vertices subtend at point Q.

f. Compute the sum of the angles mentioned above in e.

g. Comment on results that you have obtained for **e** and **f** above

You may use the following information in carrying out the above computations

1. The following example illustrates how to use the ***Apply,Plus*** command

```
x={1,2,3,4,5,6,7,8,9,10};
Apply[Plus,x]
55
```

2. For a triangle ABC,

$$a^2 = b^2 + c^2 - 2bc\ Cos\ A$$

Symbols have their usual meanings.