The purpose of this worksheet is, to demonstrate what happens if
the Simpson's Sum is applied to a sine-wave, at 1/2 Nyquist Frequency,
as if the points to be summed were samples from a stream.

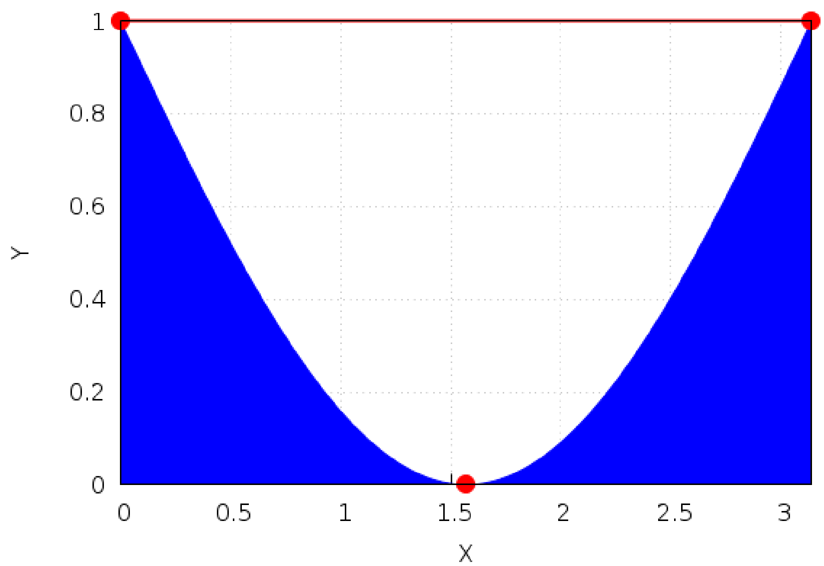
The function is (1 - sin(x)), over x = 0..Pi .

I suppose that one mistake which some people might make, when
trying to visualize this, could be to visualize the three points
as though connected by straight lines, which would suggest
highly erroneous results.

But when the samples form a stream, then the sequence
1, 0, 1, 2, 1, 0, 1, 2 ...
represents a Sine-Wave. In order for this stream to contain
a Saw-Wave, it would need to contain frequency- components
above 1/2 Nyquist Frequency!

(%i1)
```
load("draw")$
```

(%i2)
```
wxdraw2d(grid=true,
xrange = [0,%pi],
grid = true,
fill_color = blue,
filled_func = true,
explicit(1 - sin(x), x, 0, %pi),
point_type = filled_circle,
color = red,
point_size = 2,
points([[0,1],[%pi / 2, 0],[%pi, 1]]),
filled_func = false,
color = red,
line_width = 2,
explicit(1, x, 0, %pi)
)$
```



(%t2)

(%i3) integrate(1 - sin(x), x, 0, %pi);

$$\pi - 2 \quad (\%o3)$$

(%i4) integrate(1, x, 0, %pi);

$$\pi \quad (\%o4)$$

So what seems to happen, is that the real integral is as computed on line %o3 above, but the Trap function predicts %o4, while the Midpoint predicts Zero. And so, what does the Simpson's Sum predict?

(%i5) %o4 / 3 + 0;

$$\frac{\pi}{3} \quad (\%o5)$$

(%i6) float(%o5 / %o3);

$$0.9173127979613697 \quad (\%o6)$$