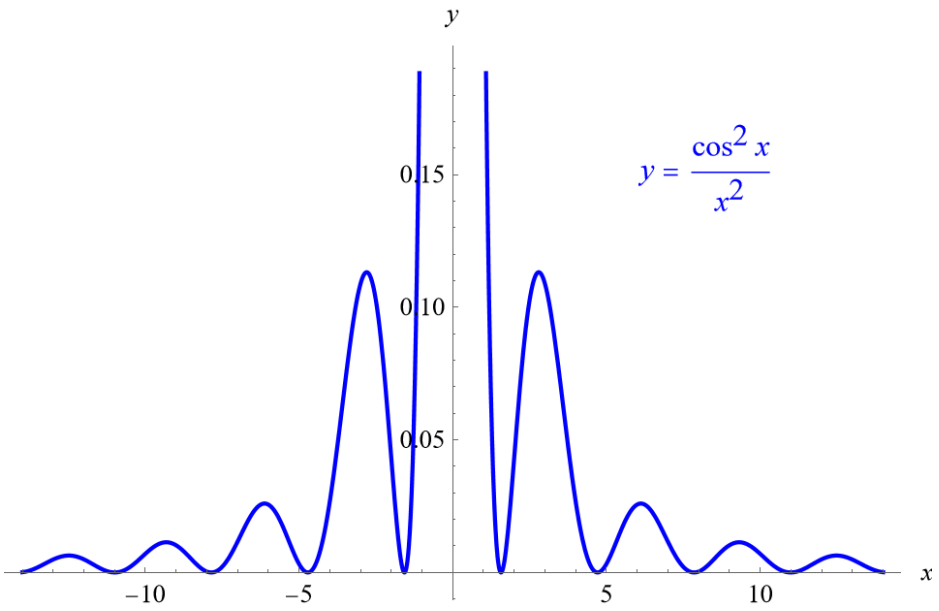
Exercise 21

Use graphs to discover the asymptotes of the curve. Then prove what you have discovered.

$$y = \frac{\cos^2 x}{x^2}$$

Solution

Below is a graph of the function versus x.



To determine the vertical asymptote(s), set what's in the denominator equal to zero and solve for x.

$$x^2 = 0$$

$$x = 0$$

To determine the horizontal asymptote(s), find the limit of the function as $x \to \pm\infty$.

$$\lim_{x\to\pm\infty} \frac{\cos^2 x}{x^2} = 0$$

Therefore, the horizontal asymptote is $y = 0$.