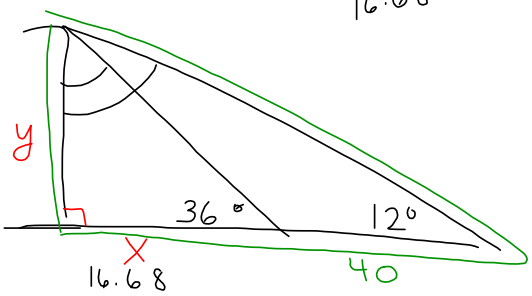
$$\tan 36^\circ = \frac{y}{16.68}$$



$$(x)\tan 36^\circ = \frac{y}{x}(x)$$

$$(x+40)\tan 12^\circ = \frac{y}{(x+40)}\cancel{(x+40)}$$

$$y = x\tan 36^\circ$$

$$y = (x+40)\tan 12^\circ$$

$$x\tan 36^\circ = (x+40)\tan 12^\circ$$

$$x(.72) = (x+40)(.212)$$

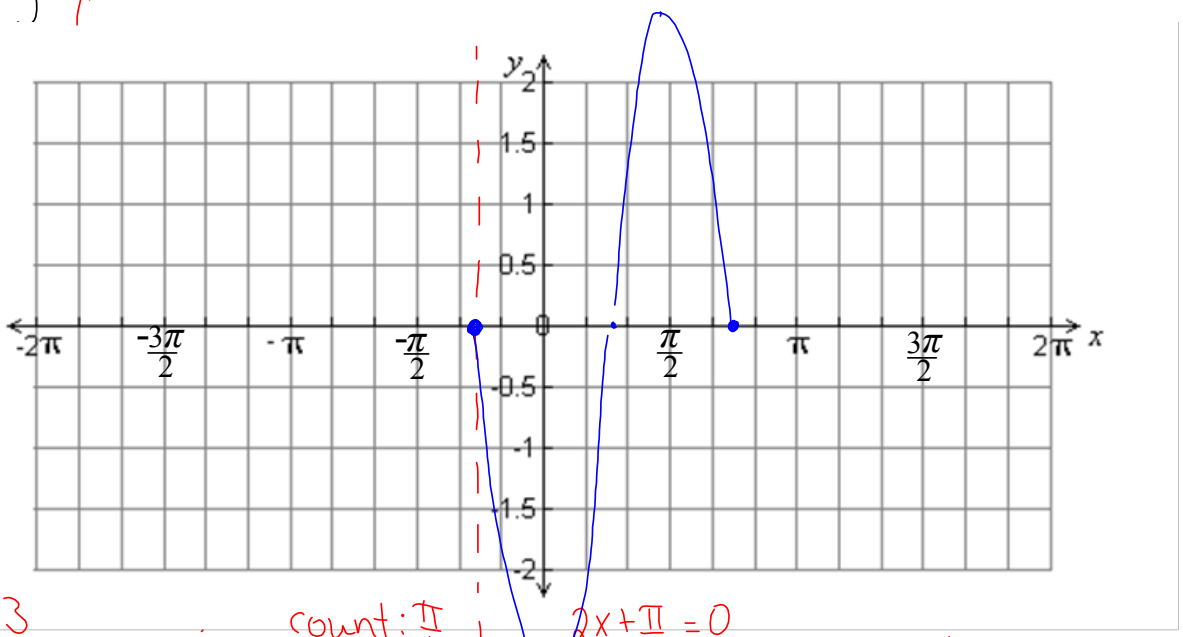
$$.72x = .212x + 8.48$$

$$-.212x \quad -.212x$$

$$.508x = 8.48$$

$$x = 16.68$$

22) $y = -3\sin\left(2x + \frac{\pi}{2}\right)$



amp: 3

reflect over x-axis

Period: $\frac{2\pi}{2} = \pi$

count: $\frac{\pi}{4}$

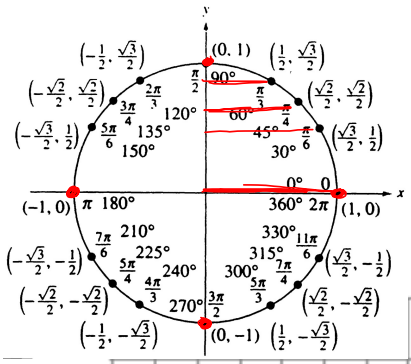
$2x + \frac{\pi}{2} = 0$

$2x = -\frac{\pi}{2}$

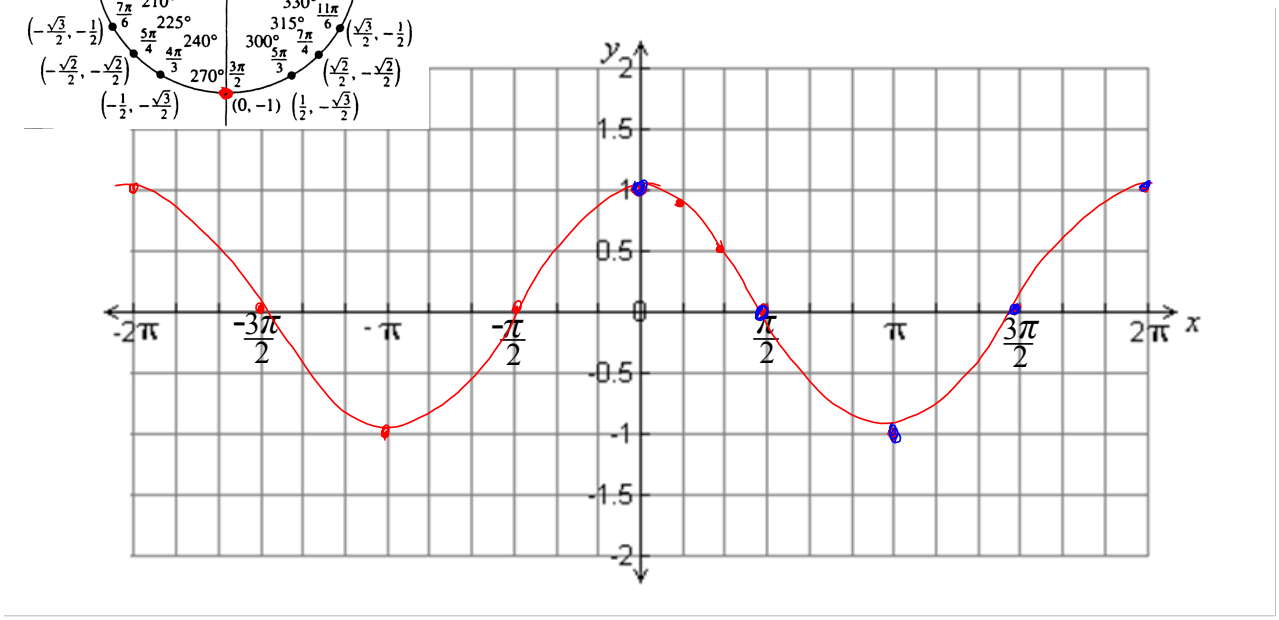
$x = -\frac{\pi}{4}$

left $\pi/4$

Unit 9 day 7 notes



$y = \cos\theta$



Study the graph to answer the following questions:

What is the period? 2π

What is the domain? $\mathbb{R}$

What is the range? $[-1, 1]$

What is the y-intercept? $(0, 1)$

Where do the x-intercepts occur?

$-\frac{3\pi}{2}, -\frac{\pi}{2}, \frac{\pi}{2}, \frac{3\pi}{2}$ $\left(\frac{\pi}{2}n, 0\right)$ n odd integer

What are the maximum values and where do they occur?

$-2\pi, 0, 2\pi$ $(2\pi n, 1)$ n is an integer

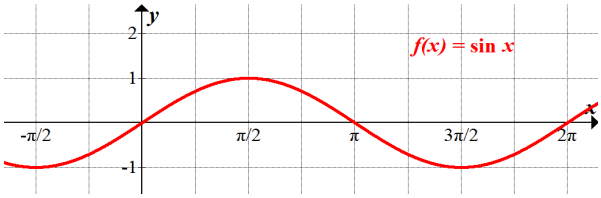
What are the minimum values and where do they occur?

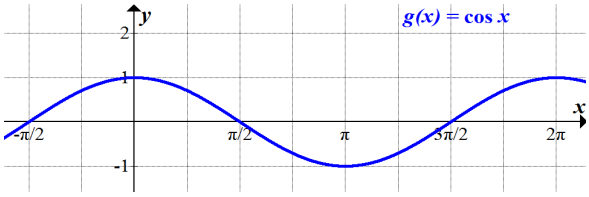
$-\pi, \pi, 3\pi, 5\pi$ $(\pi n, -1)$ n is odd integer

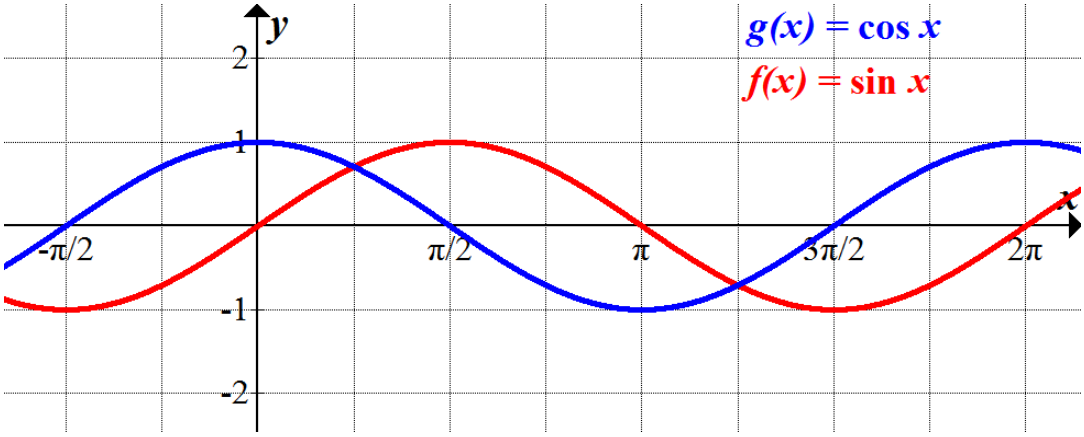
How does the cosine function compare to the sine function?

right $\frac{\pi}{2}$

Sine vs. Cosine

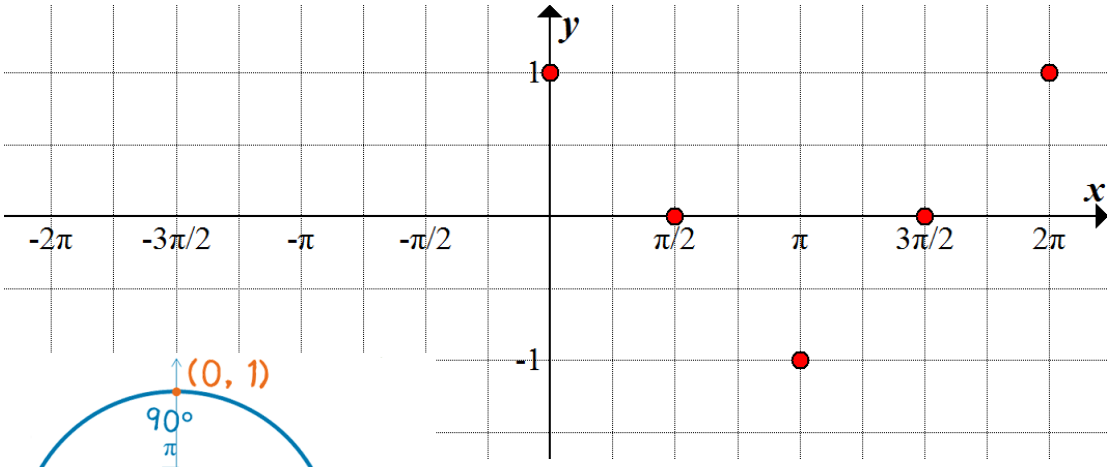


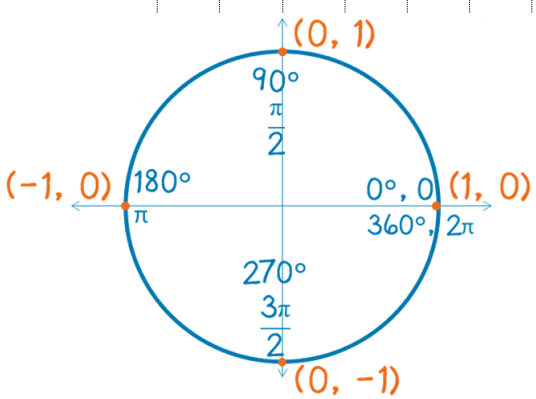




Use this five point pattern to help you sketch the sinusoid accurately!

$$f(x) = \cos x$$





The five points come from the intercepts of the unit circle!

The general form of a cosine function:

$$f(x) = a\cos b(x-h)+k$$

vertical stretch a = amplitude

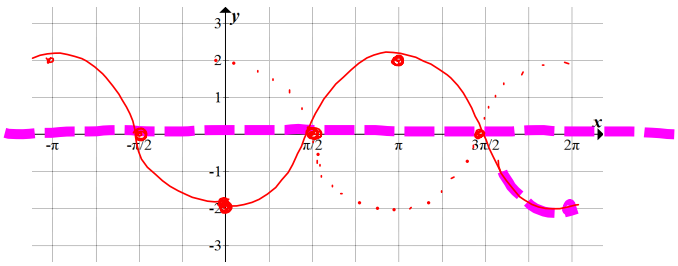
horizontal stretch period = 2π / b

horizontal shift (Phase Shift)

vertical shift (use the midline)

Graph

$$f(x) = -2\cos x$$



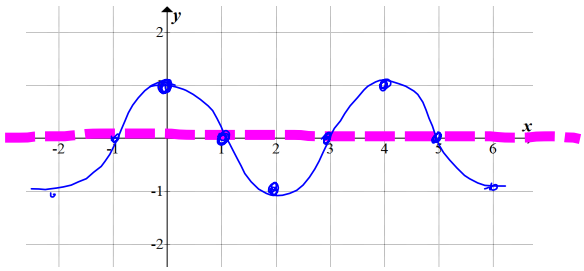
reflect over x-axis

amp: 2

period: 2π

count: $\frac{2\pi}{4} = \frac{\pi}{2}$

$$f(x) = \cos\left(\frac{\pi x}{2}\right)$$

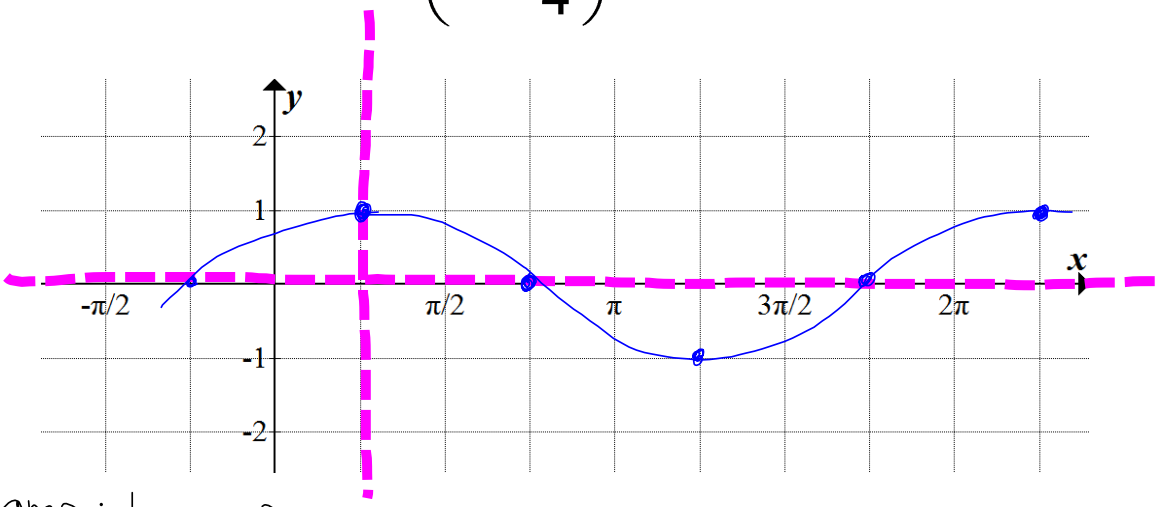


Amp: 1

period: $\frac{2\pi}{\frac{\pi}{2}} = \frac{2\cancel{\pi}}{1} \cdot \frac{2}{\cancel{\pi}} = 4$

count: $\frac{4}{4} = 1$

Graph $f(x) = \cos\left(x - \frac{\pi}{4}\right)$



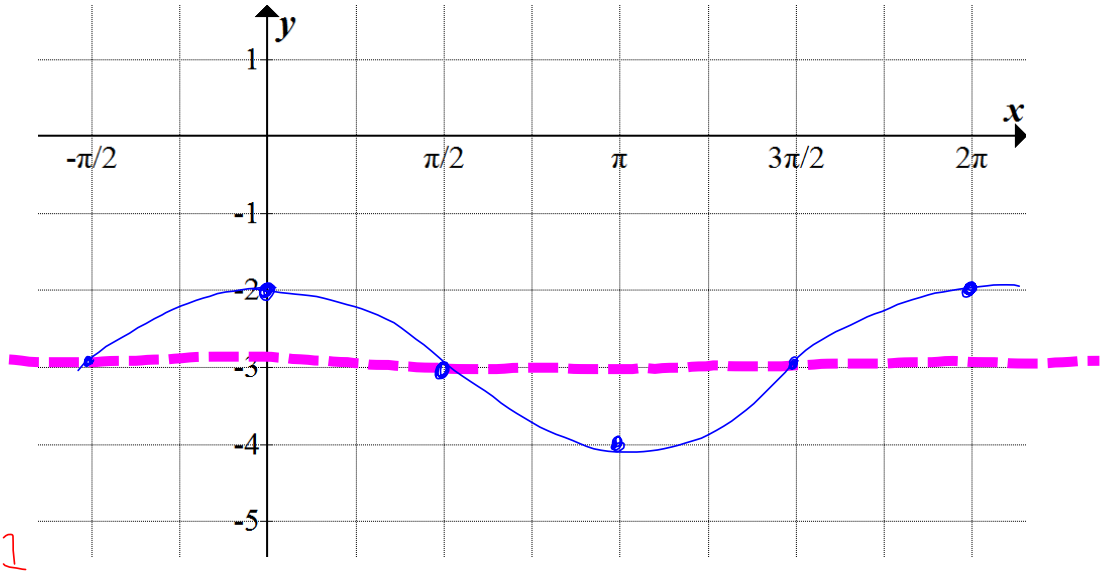
amp: 1

period: 2π

count: $\frac{2\pi}{4} = \frac{\pi}{2}$

Right $\pi/4$

Graph $f(x) = \cos x - 3$

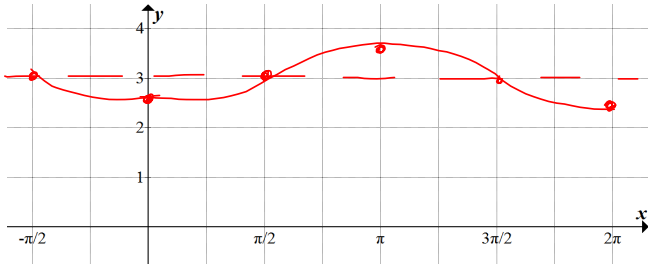


Amp: 1

Period: $\frac{2\pi}{1} = 2\pi$ down 3

count: $\frac{2\pi}{4} = \frac{\pi}{2}$

$$f(x) = -\frac{1}{2}\cos x + 3$$



Reflects

vertical shift: up 3

phase shift (L/R): None

period: 2π

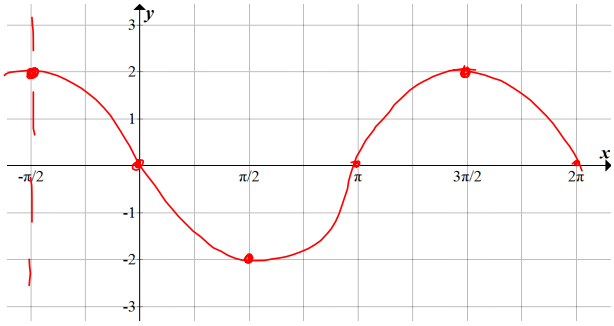
count: $\frac{\pi}{2}$

amplitude: $\frac{1}{2}$

domain: $\mathbb{R}$

range: $[2.5, 3.5]$

$$g(x) = 2\cos\left(x + \frac{\pi}{2}\right)$$



vertical shift: None

phase shift (L/R): left $\pi/2$

period: 2π

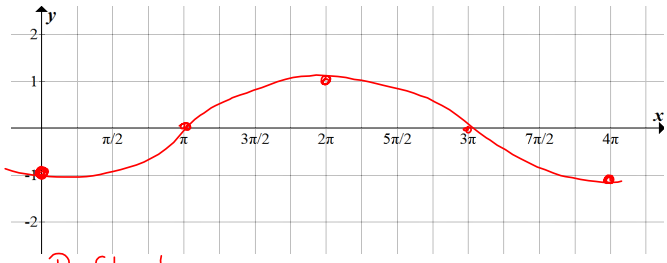
count: $\frac{\pi}{2}$

amplitude: 2

domain: $\mathbb{R}$

range: $[-2, 2]$

$$h(x) = -\cos\left(\frac{1}{2}x\right)$$



Reflects

vertical shift: None

phase shift (L/R): None

period: $\frac{2\pi}{1/2} = 2\pi \cdot \frac{2}{1} = 4\pi$

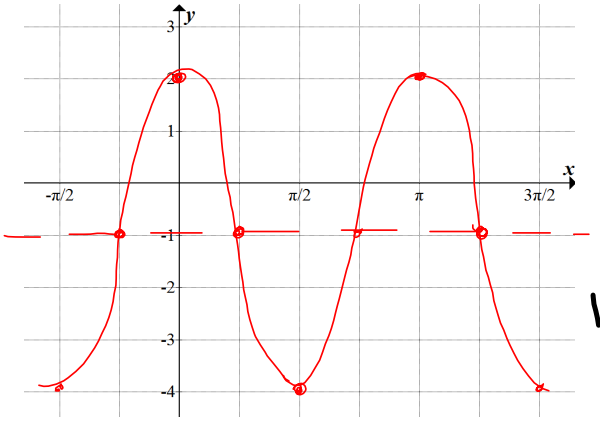
count: π

amplitude: 1

domain: $\mathbb{R}$

range: $[-1, 1]$

$$j(x) = 3\cos 2x - 1$$



vertical shift: down 1

phase shift (L/R): None

period: $\frac{2\pi}{2} = \pi$

count: $\frac{\pi}{4}$

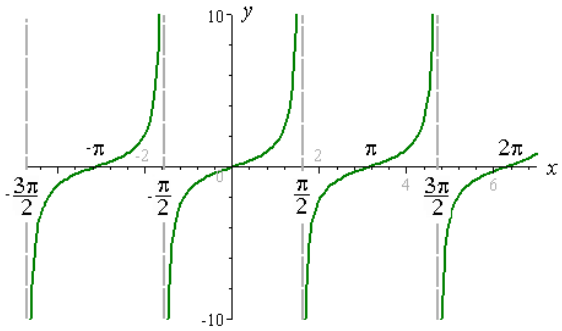
amplitude: 3

domain: $\mathbb{R}$

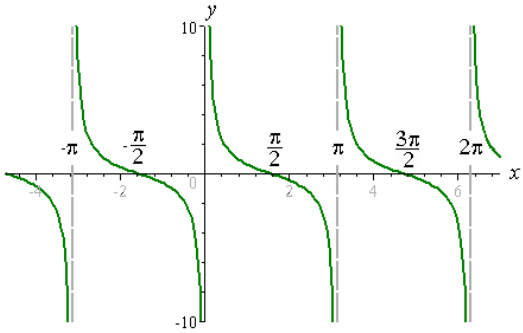
range: $[-4, 2]$

What do the other graphs look like?

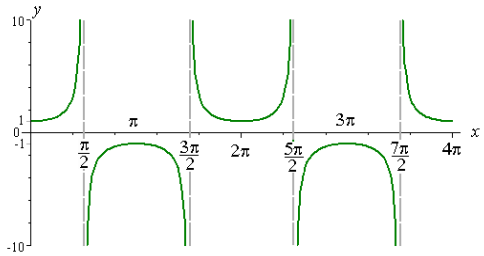
y = tanθ



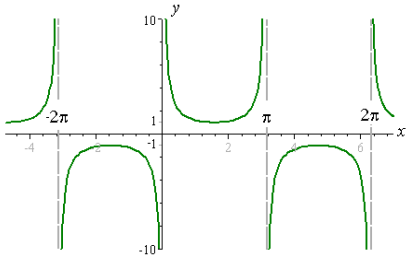
y = cotθ



y = secθ



y = cscθ



Attachments

IllustratingCosineWithTheUnitCircle.cdf