

Chapter 5 TEST

Part I – No calculator allowed

Multiple Choice

Identify the choice that best completes the statement or answers the question.

A 1. The range of the graph of $y = \cos x$ is

A. $-1 \leq y \leq 1$

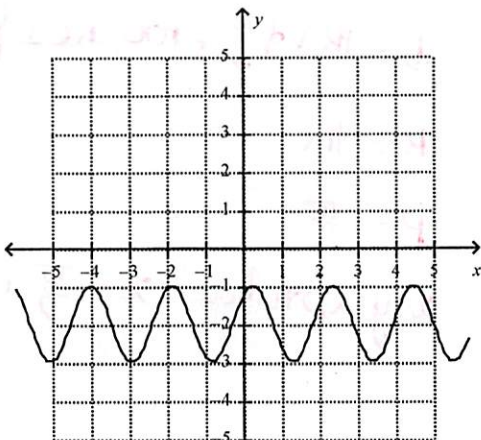
B. $0 \leq y \leq 2\pi$

C. $y \in \mathbb{R}$

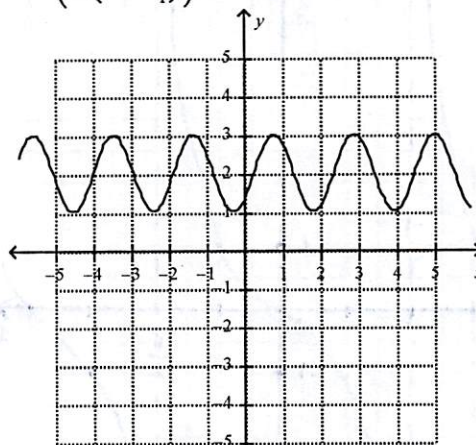
D. $-2\pi \leq y \leq 2\pi$

C 2. Which graph represents the sinusoidal function $= -\sin\left(3\left(x + \frac{\pi}{4}\right)\right) + 2$?

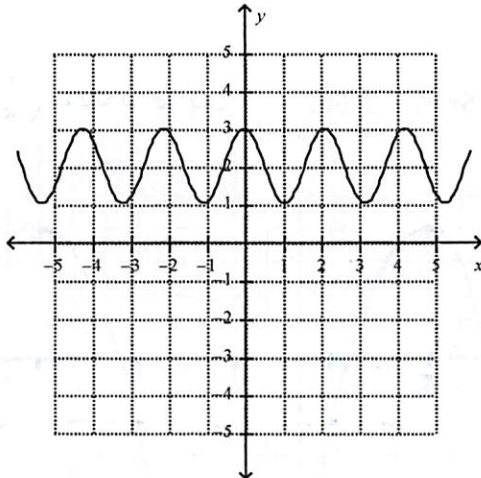
A.



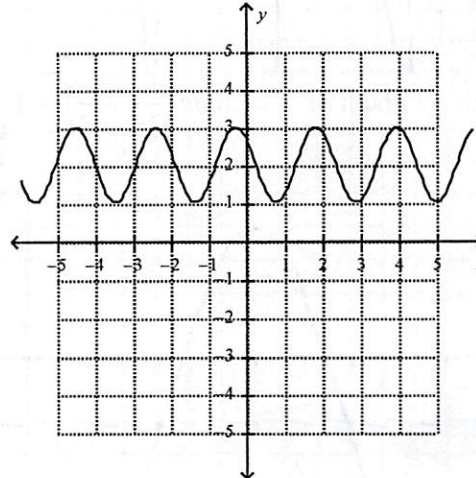
C.



B.



D.



B 3. The graph of $y = \sin x$ can be obtained by translating the graph of $y = \cos x$

A. $\frac{\pi}{4}$ units to the right

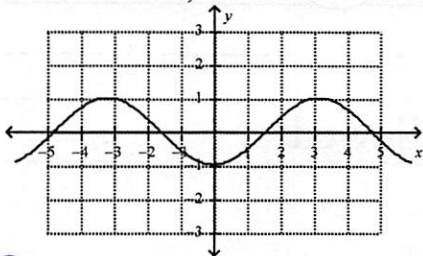
B. $\frac{\pi}{2}$ units to the right

C. $\frac{\pi}{3}$ units to the right

D. π units to the right

A

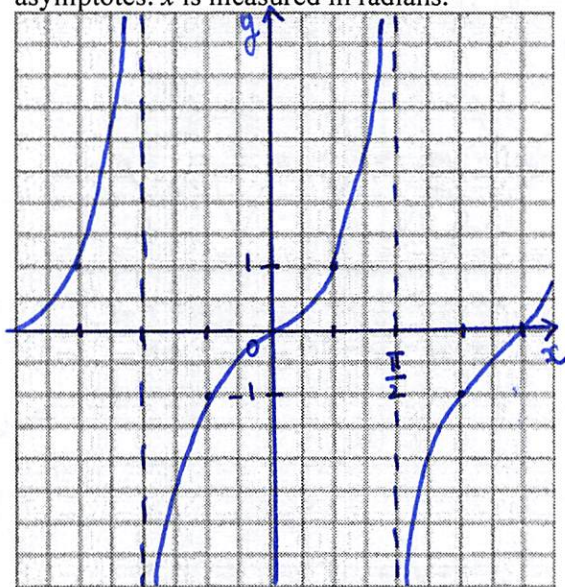
- A 4. Which function, where x is in radians, is represented by the graph shown below?



- 1
 A. $y = -\cos x$
 B. $y = \sin x$
 C. $y = \cos x$
 D. $y = -\sin x$

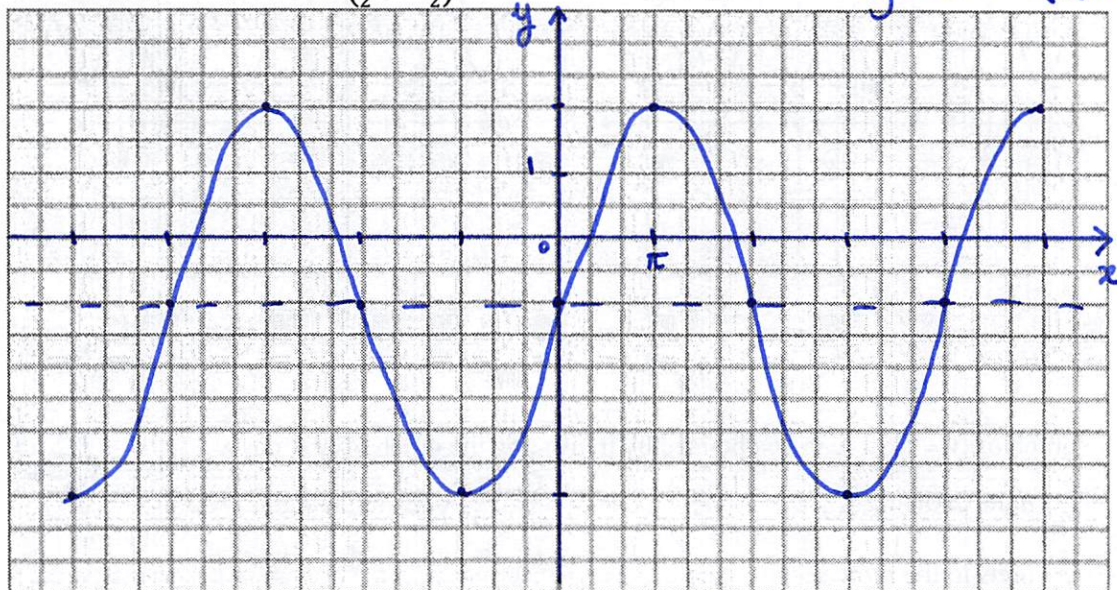
Short Answer

5. Sketch the graph of $y = \tan x$ for two cycles and state the domain, range, period, and equations of the asymptotes. x is measured in radians.



$D = \mathbb{R} \setminus \{ \frac{\pi}{2} + n\pi, n \in \mathbb{I} \}$
 $R = \mathbb{R}$
 $p = \pi$
 asymptotes: $x = \frac{\pi}{2} + n\pi, n \in \mathbb{I}$

- 3
 6. Sketch the graph of $y = 3\cos\left(\frac{1}{2}x - \frac{\pi}{2}\right) - 1$ for $-5\pi \leq x \leq 5\pi$.



$y = 3\cos\left(\frac{1}{2}(x - \pi)\right)$

$p = 4\pi$

Part II – calculators allowed

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- C 7. The period (in degrees) of the graph of $y = \cos 4x$ is
 A. 270°
 B. 180°
 C. 90°
 D. 45°

$$p = \frac{360}{4} = 90^\circ$$

Use the following information to answer the questions.

The height, h , in metres, above the ground of a car as a Ferris wheel rotates can be modelled by the function

$$h(t) = 18 \cos\left(\frac{\pi t}{80}\right) + 19, \text{ where } t \text{ is the time, in seconds.}$$

- B 8. What is the radius of the Ferris wheel?
 A. 9 m
 B. 18 m
 C. 19 m
 D. 36 m

- C 9. How long does it take for the wheel to revolve once?
 A. $\frac{\pi}{80}$ s
 B. 80 s
 C. 160 s
 D. $\frac{80}{\pi}$ s

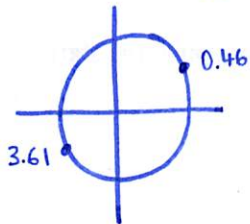
$$p = \frac{2\pi}{\frac{\pi}{80}} = 160 \text{ s}$$

- C 10. What is the minimum height of a car?
 A. 19 m
 B. 9 m
 C. 1 m
 D. 80 m

4
Problem

11. a) Solve $2\tan x = 1$, for $-\pi \leq x \leq 2\pi$

$$\tan x = \frac{1}{2}$$



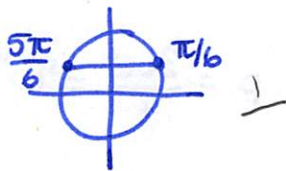
$$\theta_R \approx 0.46$$

$$x = -2.68 \text{ or } 0.46 \text{ or } 3.61$$

3

b) Solve $2\sin\left(\frac{\pi}{4}(x-6)\right) = 1, \quad 0 \leq x \leq 20$

$\sin\left(\frac{\pi}{4}(x-6)\right) = \frac{1}{2}$ period : $\frac{2\pi}{\frac{\pi}{4}} = 8 \left(= \frac{24}{3} \right)$



$\frac{\pi}{4}(x-6) = \frac{\pi}{6}$ or $\frac{\pi}{4}(x-6) = \frac{5\pi}{6}$

$x-6 = \frac{2}{3}$ $x-6 = \frac{10}{3}$

$x = \frac{20}{3} \pm 8$ $x = \frac{28}{3} \pm 8$

4

$x = \frac{4}{3}$ or $\frac{20}{3}$ or $\frac{28}{3}$ or $\frac{44}{3}$ or $\frac{52}{3}$

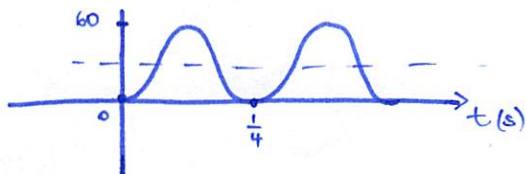
12. A pebble is embedded in the tread of a rotating bicycle wheel of diameter 60 cm. The wheel rotates at 4 revolutions per second. You want to determine a relationship between the height, h , in centimetres, of the pebble above the ground as a function of time, t , in seconds.

a) Determine the period of the function.

8π 4 rev per s
1 rev per $\frac{1}{4}$ s $P = \frac{1}{4}$

1

b) Draw a rough shape of the graph with some key elements. (Consider that at the start, the pebble is touching the ground).



1

c) Determine the height as a function of t .

* $P = \frac{2\pi}{b} \Rightarrow b = 8\pi$

* $|a| = 30$ * $k = 30$

$y = -30 \cos(8\pi t) + 30$

2