Topping Trigonometry

These are 10 popular advanced trigonometry problems. Test or practice your trig skills on your way to the top of your math class.

Use Photomath to check your answers or to help you work through steps when you're stuck. In some cases, you will need to apply multiple math concepts to determine the best or most appropriate solution format. Full solutions are at the end for your reference.

Question 1. Which of the expressions is equivalent to:

$$\frac{\cos(\theta)}{1-\sin(\theta)} - \tan(\theta)$$

A. $\sec(\theta)$ B. $\sin(\theta)$ C. $\cos(\theta)$ D. $\csc(\theta)$

Question 2. Prove the following identities

$$\frac{\csc\theta}{\sin\theta} = \csc^2\theta \qquad \frac{\sin^2\theta}{1-\sin^2\theta} = \tan^2\theta$$

Question 3. Express each of the following in terms of sine and cosine:

A. $\tan x \times \sec^2 x$ B. $\dfrac{\cot x}{\csc x}$

Question 4. Select one or more expressions that together represent all solutions to the equation. The answer will be in radians.

(Hint : $\arccos \frac{1}{10} \approx 1.47$)

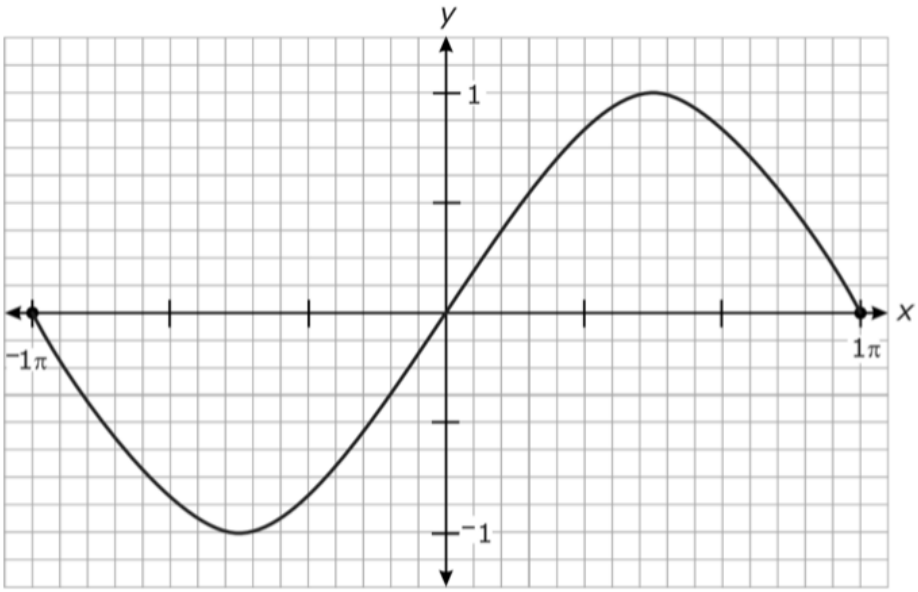
$$\cos(x) = -0.1$$

◯ $1.67+\mathrm{k} \times 2\pi$
◯ $1.47+\mathrm{k} \times \pi$
◯ $-1.47+\mathrm{k} \times \pi$
◯ $-1.67+\mathrm{k} \times 2\pi$
◯ $-1.67+\mathrm{k} \times \pi$
◯ $4.61+2\mathrm{k}\pi$

Question 5. Identify the domain of the following function

$$y = 2 \times sin^{-1}(2x)$$

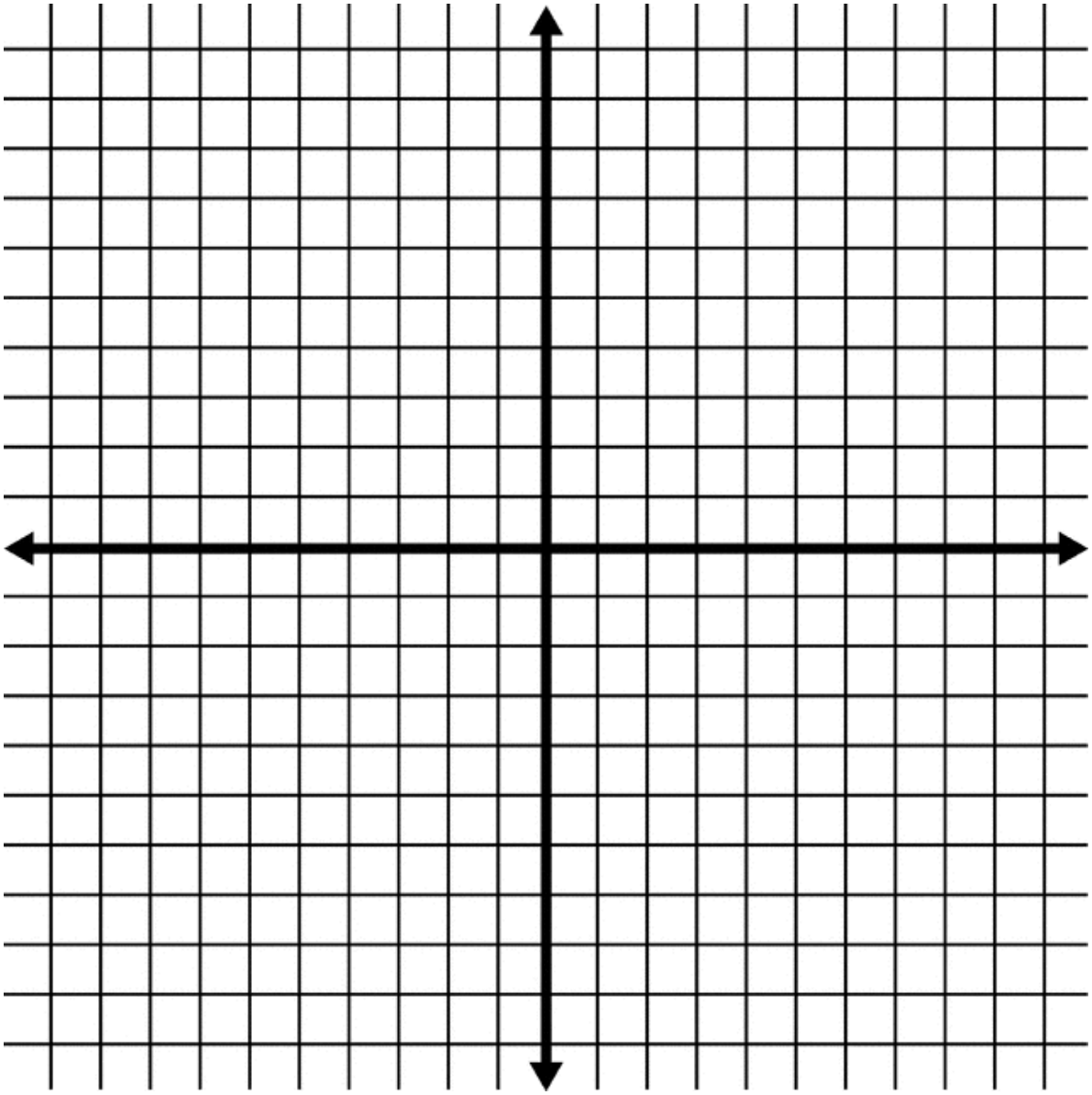
Question 6. Which function is graphed below:



A. $y = \sin x$ B. $y = \cos x$ C. $y = \tan x$ D. $y = \cot x$

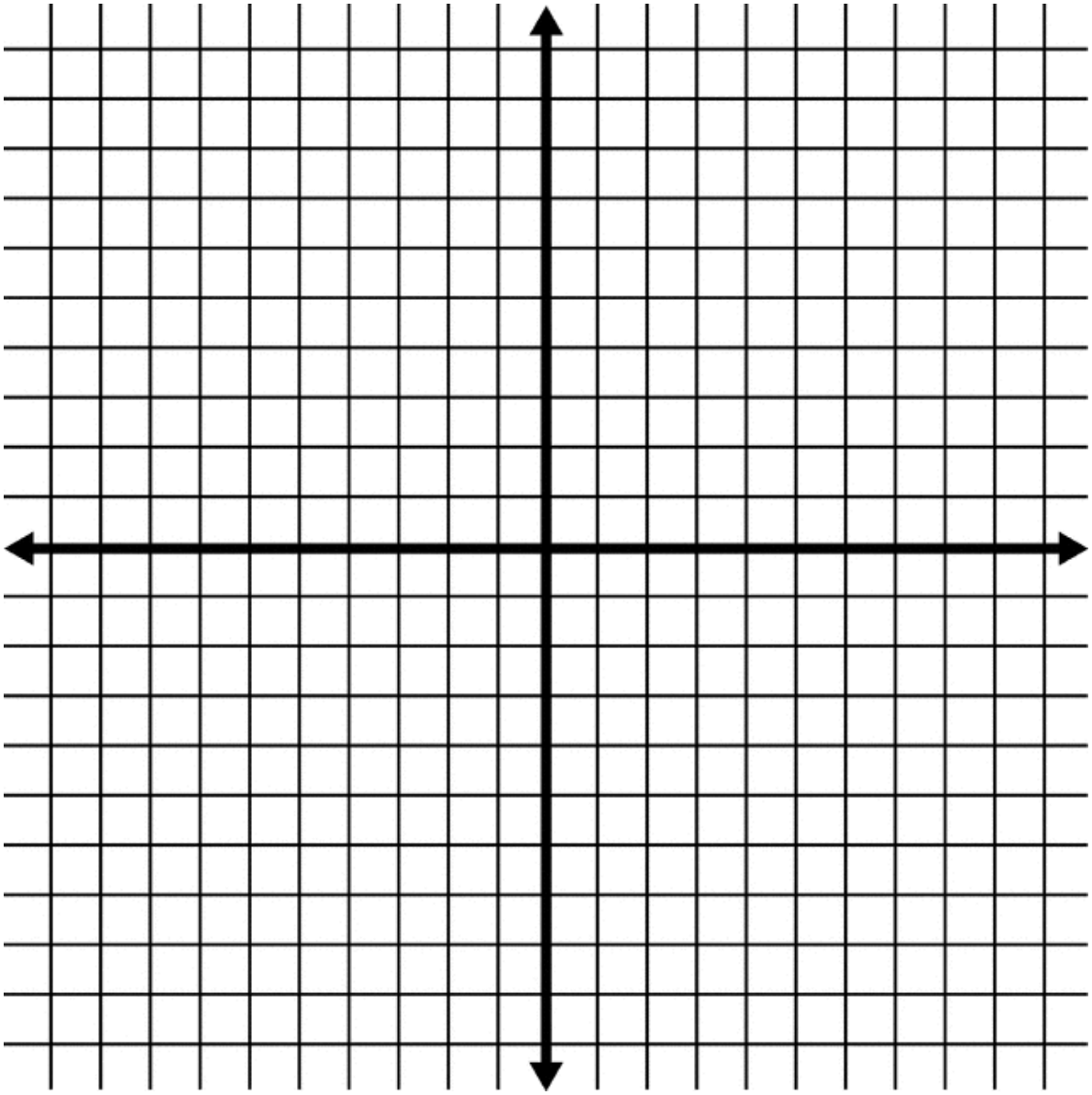
Question 7. Sketch the graph for:

$$\tan(4x) \quad \text{for} \quad 0 \leq x \leq 2\pi$$



Question 8. Sketch the graph of the function:

$$y = \sin^{-1} 2x$$



Question 9. Solve the following.

A. $\sin^2(x) - 3\sin(x) + 2 = 0$

B. $3 \times \cos(x + \pi) = 2$

C. $\sin(x) - \sqrt{3}) = 0$

Question 10. Solve the following:

A. $\csc(90°)$

B. $\dfrac{\cot^2(a) - 1}{2\cot(a)}$

C. $\cos(100°)\cos(40°) + \sin(100°)\sin(40°)$

Solutions

Question 1: A

Question 2:

Solving with Photomath

- Scan the full equation and click the solution. Tap "Show other methods" and select "verify the identity" and compare the results

Question 3:

A. $\frac{\sin x}{\cos x^3}$

B. $\cos x$

Question 4: $1.67 + k(2\pi)$ and $4.61 + k(2\pi)$

Solving with Photomath

- Scan the given equation in Photomath and use the hint to plug in 1.47. Next, subtract 1.47 from π and also find $\pi + 1.47$

Question 5:

$x \in [-\frac{1}{2}, \frac{1}{2}]$

Question 6: A

- Scan each equation in Photomath and compare the graphs to the one shown

Question 7:

- Scan problem to check your answer with Photomath

Question 8:

- Scan problem to check your answer with Photomath

Question 9:

A. $x = \frac{\pi}{2} + 2k\pi, k \in Z$

B. $x = \begin{cases} \pi - \arccos\frac{2}{3} + 2k\pi \\ \pi + \arccos\frac{2}{3} + 2k\pi \end{cases} \text{k} \in Z$

C. $x = \frac{\pi}{3} + k\pi, k \in Z$

Question 10:

A. 1

B. $\cot(2a)$

C. $\frac{1}{2}$