**Topic**: Inverse trig functions

**Question**: On what range is the inverse secant function defined?

**Answer choices**:

A $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

B $(-\infty, \infty)$

C $(-\infty, 1] \cup [1, \infty)$

D $\left[0, \frac{\pi}{2}\right) \cup \left(\frac{\pi}{2}, \pi\right]$

**Solution**: D

The range of the secant function

$$y = \sec^{-1} x = \frac{1}{\cos^{-1} x}$$

is $0 \leq y \leq \pi$, excluding $y = \pi/2$.

**Topic**: Inverse trig functions

**Question**: Find the exact value of the inverse cosine function.

$$\arccos\left(-\frac{\sqrt{3}}{2}\right)$$

**Answer choices**:

A $\frac{5\pi}{6}$

B $\frac{4\pi}{3}$ and $\frac{5\pi}{3}$

C $\frac{4\pi}{3}$

D $\frac{5\pi}{6}$ and $\frac{7\pi}{6}$

**Solution**: A

If we look at the unit circle, we can see that the cosine function is $-\sqrt{3}/2$ when $\theta = 5\pi/6$ and when $\theta = 7\pi/6$. But because we're dealing with the inverse cosine function, we only want an angle in the interval $[0,\pi]$.

The angle $\theta = 5\pi/6$ is the only angle in $[0,\pi]$, so

$$\arccos\left(-\frac{\sqrt{3}}{2}\right) = \frac{5\pi}{6}$$

**Topic**: Inverse trig functions

**Question**: Find the value of the inverse cosecant function.

$$\csc^{-1}(\sqrt{2})$$

**Answer choices**:

A $\frac{3\pi}{4}$

B $\frac{7\pi}{4}$

C $\frac{\pi}{4}$

D $\frac{\pi}{4}$ and $\frac{3\pi}{4}$

**Solution**: C

The reciprocal identity for cosecant tells us that

$$\csc\theta = \frac{1}{\sin\theta}$$

To get the inverses for the reciprocal functions, you do the same thing, but we'll take the reciprocal of what's in the parentheses and then use the "normal" trig functions.

To get $\csc^{-1}(\sqrt{2})$, we have to look for $\sin^{-1}(1/\sqrt{2})$, which gives $\pi/4$ and $3\pi/4$. But because we're dealing with the inverse sine function, we only want an angle in the interval $[-\pi/2,\pi/2]$. Therefore, $\csc^{-1}(\sqrt{2}) = \sin^{-1}(1/\sqrt{2}) = \pi/4$, or $45°$.