1. Find the value of $\sin \frac{\pi}{3}$.

A 0  
B $\frac{1}{2}$  
C $\frac{\sqrt{3}}{2}$  
D $\frac{\sqrt{2}}{2}$  
E 1

2. Find the value of $\cos \frac{\pi}{2}$.

A 0  
B $\frac{1}{2}$  
C $\frac{\sqrt{3}}{2}$  
D $\frac{\sqrt{2}}{2}$  
E 1
3. Find the value of \( \tan \frac{\pi}{6} \).

- A 0
- B \( \frac{1}{2} \)
- C \( \frac{\sqrt{3}}{3} \)
- D \( \sqrt{3} \)
- E 1

4. Find the value of \( \sec \frac{\pi}{4} \).

- A 0
- B 1
- C \( \frac{2\sqrt{3}}{3} \)
- D \( \sqrt{2} \)
- E 2

5. Find the value of \( \cos \left( -\frac{\pi}{4} \right) \).

- A \( \frac{1}{2} \)
- B \( -\frac{1}{2} \)
- C \( -\frac{\sqrt{2}}{2} \)
- D \( -\frac{\sqrt{3}}{2} \)
- E None of the above

Solution: The reference number for \( -\pi/4 \) is \( \pi/4 \). Since the terminal point of \( -\pi/4 \) is in Quadrant IV, \( \cos(-\pi/4) \) is positive. Thus

\[
\cos \left( -\frac{\pi}{4} \right) = \cos \frac{\pi}{4} = \frac{\sqrt{2}}{2}
\]

An other way to obtain the same answer is to use the fact that cosine is an even function.
6. Find the value of \( \cos \frac{16\pi}{3} \).

- A \( \frac{1}{2} \)
- B \( -\frac{1}{2} \)
- C \( \frac{\sqrt{3}}{2} \)
- D \( -\frac{\sqrt{3}}{2} \)
- E None of the above

Solution: Since

\[
\frac{16\pi}{3} = \frac{15\pi + \pi}{3} = \frac{15\pi}{3} + \frac{\pi}{3} = 5\pi + \frac{\pi}{3}
\]

the reference number for \( 16\pi/3 \) is \( \pi/3 \) and the terminal point of \( 16\pi/3 \) is in Quadrant III. Thus \( \cos(16\pi/3) \) is negative and

\[
\cos \frac{16\pi}{3} = -\cos \frac{\pi}{3} = -\frac{1}{2}
\]

7. Find the value of \( \tan \frac{121\pi}{6} \).

- A \( 1 \)
- B \( \sqrt{3} \)
- C \( -\sqrt{3} \)
- D \( \frac{\sqrt{3}}{3} \)
- E \( -\frac{\sqrt{3}}{3} \)

Solution: Since

\[
\frac{121\pi}{6} = \frac{120\pi + \pi}{6} = \frac{120\pi}{6} + \frac{\pi}{6} = 20\pi + \frac{\pi}{6}
\]

the reference number for \( 121\pi/6 \) is \( \pi/6 \) and the terminal point of \( 121\pi/6 \) is in Quadrant I. Thus \( \tan(121\pi/6) \) is positive and

\[
\tan \frac{121\pi}{6} = \tan \frac{\pi}{6} = \frac{\sqrt{3}}{3}
\]
8. Find the value of $\csc \frac{17\pi}{3}$.

- **A** $-\frac{2\sqrt{3}}{3}$
- **B** $\frac{2\sqrt{3}}{3}$
- **C** $-\frac{\sqrt{3}}{3}$
- **D** $\frac{\sqrt{3}}{3}$
- **E** None of the above

Solution: Since $\frac{17\pi}{3} = \frac{18\pi}{3} - \frac{\pi}{3} = \frac{18\pi}{3} - \frac{\pi}{3} = 6\pi - \frac{\pi}{3}$
the reference number for $17\pi/3$ is $\pi/3$ and the terminal point of $17\pi/3$ is in Quadrant IV. Thus $\csc(17\pi/3)$ is negative and

$$\csc \frac{17\pi}{3} = -\csc \frac{\pi}{3} = -\frac{2\sqrt{3}}{3}$$

9. Find the value of $\arcsin 1$.

- **A** 1
- **B** $\frac{\pi}{6}$
- **C** $\frac{\pi}{4}$
- **D** $\frac{\pi}{3}$
- **E** $\frac{\pi}{2}$

Solution: $\arcsin 1 = \frac{\pi}{2}$, since $\sin \frac{\pi}{2} = 1$ and $\frac{\pi}{2} \in \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$. 
10. Find the value of $\arccos \frac{1}{2}$.

A 2
B $\frac{\pi}{6}$
C $\frac{\pi}{4}$
D $\frac{\pi}{3}$
E $\frac{\pi}{2}$

Solution: $\arccos \frac{1}{2} = \frac{\pi}{3}$, since $\cos \frac{\pi}{3} = \frac{1}{2}$ and $\frac{\pi}{3} \in [0, \pi]$.

11. Find the value of $\sec^{-1}(-2)$.

A 0
B $\pi$
C $\frac{\pi}{4}$
D $\frac{2\pi}{3}$
E $\frac{4\pi}{3}$

Solution: $\sec^{-1}(-2) = \frac{4\pi}{3}$, since $\sec \frac{4\pi}{3} = -2$ and $\frac{4\pi}{3} \in \left(0, \frac{\pi}{2}\right) \cup \left(\pi, \frac{3\pi}{2}\right)$.
In the following problems you are required to show all your work and provide the necessary explanations everywhere to get full credit.

1. Find the amplitude, period, phase shift and graph one complete period of the function \( y = 2 \cos \left( \frac{1}{2}x + 1 \right) \).

Solution: We first write this function in the form \( y = a \cos k(x - b) \). To do this, we factor \( \frac{1}{2} \) from the expression \( \frac{1}{2}x + 1 \) to get

\[
y = 2 \cos \frac{1}{2} [x - (-2)]
\]

Thus we have

- amplitude = \(|a| = 2\)
- period = \( \frac{2\pi}{k} = \frac{2\pi}{1/2} = 4\pi \)
- phase shift = \( b = -2 \) (Shift 2 to the left)

From this information it follows that one period of this cosine curve begins at \(-2\) and ends at \(-2 + 4\pi\). To sketch the graph over the interval \([-2, -2 + 4\pi]\), we divide this interval into four equal parts and graph a cosine curve with amplitude 2 as shown in the Figure below.

We can also find one complete period as follows:

- Start of period: \( \frac{1}{2}x + 1 = 0 \)
  - \( x = -2 \)
  - \( x = -2 + 4\pi \)
- End of period: \( \frac{1}{2}x + 1 = 2\pi \)
  - \( x = -2 \)
  - \( x = -2 + 4\pi \)

So we graph one period on the interval \([-2, -2 + 4\pi]\).

We finally note that the \( x \)-intercepts are \( x = \pi - 2 \) and \( x = 3\pi - 2 \).
2. Graph the function $y = -\cot x$.

Solution: To graph $y = -\cot x$ we reflect the graph of $y = \cot x$ about the $x$-axis:

![Graph of $y = -\cot x$](image)

3. Graph the function $y = \sec^{-1} x$.

Solution:

![Graph of $y = \sec^{-1} x$](image)