# Saitech Inverse Trigonometry Test

## Saitech Unit Test - Inverse Trigonometry

**Total Marks: 45**
**Time: 1 hour**

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### Section A: Short Answer Questions (2 marks each)

1. Find the domain of the following functions:
   (i) $\tan^{-1}\left(\sqrt{9 - x^2}\right)$
   (ii) $\frac{1}{2}\tan^{-1}(1 - x^2) - \frac{\pi}{4}$

2. Find the value of:
   (i) $\tan^{-1}\left(\tan \frac{5\pi}{4}\right)$
   (ii) $\tan^{-1}\left(\tan\left(-\frac{\pi}{6}\right)\right)$

3. State the reason for $\cos^{-1}\left(\cos\left(-\frac{\pi}{6}\right)\right) \neq \frac{\pi}{6}$.

4. Find all values of $x$ such that:
   (i) $-6\pi \leq x \leq 6\pi$ and $\cos x = 0$
   (ii) $-5\pi \leq x \leq 5\pi$ and $\cos x = 1$

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### Section B: Long Answer Questions (4 marks each)

5. Find the principal value of $\cos^{-1}\left(\frac{1}{2}\right)$.

6. Is $\cos^{-1}(-x) = \pi - \cos^{-1}(x)$ true? Justify your answer.

7. For what value of $x$, the inequality $\frac{\pi}{2} < \cos^{-1}(3x - 1) < \pi$ holds?

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### Section C: Problem Solving Questions (5 marks each)

8. Find the value of:
   (i) $\tan\left(\cos^{-1}\left(\frac{1}{2}\right) - \sin^{-1}\left(-\frac{1}{2}\right)\right)$
   (ii) $\sin\left(\tan^{-1}\left(\frac{1}{2}\right) - \cos^{-1}\left(\frac{4}{5}\right)\right)$
   (iii) $\cos\left(\sin^{-1}\left(\frac{4}{5}\right) - \tan^{-1}\left(\frac{3}{4}\right)\right)$

9. Find the domain of the following functions:
   (i) $f(x) = \sin^{-1}\left(\frac{|x|-2}{3}\right) + \cos^{-1}\left(\frac{1-|x|}{4}\right)$
   (ii) $g(x) = \sin^{-1} x + \cos^{-1} x$

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### Section D: Comprehensive Questions (6 marks each)

10. Find the value of:
    (i) $\cos^{-1}\left(\cos^{-1}\left(\frac{4}{5}\right) + \sin^{-1}\left(\frac{4}{5}\right)\right)$

(ii) $\cos^{-1}\left(\cos\left(\frac{4\pi}{3}\right) + \cos^{-1}\left(\frac{5\pi}{4}\right)\right)$

(iii) $\cos\left(\cos^{-1}\left(\frac{4}{5}\right) + \sin^{-1}\left(\frac{4}{5}\right)\right)$

11. Find the value of:

   (i) $\cos^{-1}\left(\frac{\pi}{7}\cos\left(\frac{\pi}{17}\right) - \sin\left(\frac{\pi}{7}\right)\sin\left(\frac{\pi}{17}\right)\right)$

   (ii) $\cos^{-1}\left(\cos\left(\frac{4\pi}{5}\right) + \sin\left(\frac{4\pi}{5}\right)\right)$

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## Instructions:

- Answer all questions.
- Use a separate sheet for rough work.
- Ensure clarity and neatness in your answers.

Good luck!