

Final Examination Math 1730

Name

Fall 2004 100 Points

Score

Show work in each problem to earn full credit.

1. Verify each identity.

a. $\tan \theta \sin \theta + \cos \theta = \sec \theta$

b. $\frac{\tan x}{1 - \cos x} = \csc x(1 + \sec x)$

c. $\frac{2 \tan x}{1 + \tan^2 x} = \sin 2x$

2. Let $x = 2 \sin \theta$, $-\frac{\pi}{2} < \theta < \frac{\pi}{2}$. Simplify the expression

$$\frac{x}{\sqrt{4-x^2}}$$

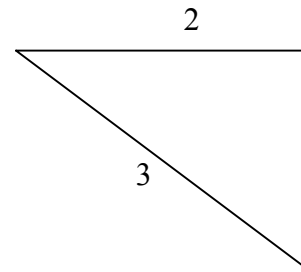
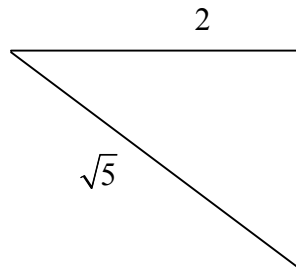
3. Find the exact function values of

a. $\sin 8^\circ \cos 22^\circ + \cos 8^\circ \sin 22^\circ$

b. $\sin 75^\circ$

c. $\sin \frac{\pi}{12}$

4. For angles α and β in the figures, find $\cos(\alpha - \beta)$.



5. (a) Write $\sin 3x \cos 5x$ as a sum of trigonometric functions.

(b) Write $\sin 2x - \sin 5x$ as a product of trigonometric functions.

6. If $\sin \theta = \frac{-4}{5}$ and θ is in quadrant III, find $\cot\left(\frac{\theta}{2}\right)$.

7. Use the graphing calculator to graph the given functions and specify the domain and the range of each function.

Function	Domain	Range
$y = \sin^{-1} x$		
$y = \cos^{-1} x$		
$y = \tan^{-1} x$		

8. Solve each trigonometric equation in the interval $[0, 2\pi)$.

(a) $2 \cos^2 x + 5 \cos x + 2 = 0$

(b) $\sin 2x = \cos x$

9. Find all solutions in the interval $[0, 2\pi)$, correct to five decimal places:

$$5 \cos 2x + 2 = 4$$

10. Find the exact value of $\cos\left(\tan^{-1} \frac{9}{40}\right)$.

11. Let $z = 1 + i\sqrt{3}$.

(a) Graph z in the complex plane.

(b) Write z in trigonometric form.

(c) Find the complex number z^9 .

12. Let $z_1 = 4\left(\cos\frac{7\pi}{12} + i\sin\frac{7\pi}{12}\right)$ and $z_2 = 2\left(\cos\frac{5\pi}{12} + i\sin\frac{5\pi}{12}\right)$.

(a) Find $z_1 z_2$.

(b) Find $\frac{z_1}{z_2}$.