

Trigonometry
Sample Final Exam - 6 pages
Math 1060

NAME: _____

TIME LIMIT: 1 Hour and 50 Minutes Calculator Allowed: Scientific

The point value of each problem is in the left-hand margin. You must show your work to receive full credit for your answers, except on problem 1. Round off all decimals in your answers to two places. Work neatly.

(20) 1. Fill in the blank.

- (a) Simplifying $(2i - 1)(1 + i)$ we get $(2i - 1)(1 + i) =$ _____ .
- (b) $\sin 2\theta =$ _____ is a double-angle identity.
- (c) The period of the function $f(x) = 3 \csc(3x - \pi)$ is _____ .
- (d) Using an angle-sum identity $\cos 85^\circ = \cos 35^\circ \cos 50^\circ -$ _____ .
- (e) The amplitude of the function $f(x) = -5 \cos(3x + 2)$ is _____ .
- (f) $\sin(\alpha - \beta) = \sin \alpha$ _____ is an identity for the difference of two angles.
- (g) The range of the function $y = \cos^{-1} x$ is [_____ , _____] .
- (h) All solutions of the equation $\sin x = 1$ are $x =$ _____ for $n = 0, \pm 1, \pm 2, \dots$.
- (i) 456° is _____ radians.
- (j) $\sin^{-1}(\sin \frac{3\pi}{4}) =$ _____ .
- (k) The *exact* value of $\tan(210^\circ)$ is _____ .
- (l) The *exact* value of $\sec^{-1}(-2)$ is _____ .
- (m) Angle _____ radians is between 0 and 2π and has the same terminal side as the angle $-\frac{3\pi}{4}$.
- (n) $\cos(\cos^{-1} 0.257) =$ _____ .
- (o) Angle $\alpha =$ _____ $^\circ$ is between 0° and 180° and $\tan \alpha = \tan(-52^\circ)$.
- (p) The three 3rd roots of $z = -8$ are $w_1 =$ _____ $+ i$, $w_2 = -2$ and $w_3 =$ _____ $- i$.
- (q) The magnitude of the vector $\vec{u} = \langle 2, 3 \rangle$ is $|\vec{u}| =$ _____ .
- (r) The polar coordinates of the point $(-4, 2)$, given in rectangular coordinates, is (_____ , _____) .
- (s) The graph of the polar equation $r = 4 \sin \theta$ is a _____ .
- (t) The frequency of the simple harmonic motion with displacement function $d(t) = 2 \cos(3t)$ is _____ .

(10) 2. Find the *exact* value of $\sec \theta$ if $\tan \theta = \frac{7}{4}$ and $\sin \theta < 0$.

(10) 3. Given that $\cos 15^\circ = \frac{\sqrt{6}-\sqrt{2}}{4}$, find the *exact* value of $\sin 255^\circ$.

(10) 4. Find the *exact* value of $\cos(165^\circ)$.

(10) 5. Find the *exact* value of $\cos\left(\cos^{-1}\frac{12}{13} + \sin^{-1}\frac{4}{5}\right)$.

(15) 6. Graph $f(x) = 2\cos(x - \pi/4)$ and $g(x) = 2\sec(x - \pi/4)$ on the same coordinate system. State amplitude, period and phase shift of each function, if applicable. Plot at least 6 points for each graph. List the plotted points in a table.

(15) 7. Draw the graph of $r = 2 + \sin \theta$.

(10) 8. Evaluate $(-2 + i)^{10}$. Write your answer in the standard form, $a + bi$.

(10) 9. Solve $3 \sin x - 2 \cos x = 2$.

(10) 10. A man walks for four miles in the direction $N30^\circ W$. He then walks in the direction $N45^\circ E$ for three miles. What is his distance from his original position?

(10) 11. The clock tower is on the line segment connecting Tracy Hall and the union building. Suppose the distance between Tracy Hall and the union building is 390 feet. If the angle of elevation from Tracy Hall to the top of the clock tower is 20° and the angle of elevation from the union building to the top of the clock tower is 45° , find the height of the clock tower.

(10) 12. Prove the identity $\frac{1}{\cot x + 1} + \frac{\cos x}{\cos x + \sin x} = 1$.

(10) 13. Find all “standard” triangles such that $\alpha = 30^\circ$ $a = 8$ and $b = 10$. Note: Your textbook uses A in place of α .