

MATH 8 – Sample Final

This test is in two parts. On part one, you may not use a calculator; on part two, a calculator is necessary. When you complete part one, you turn it in and get part two. Once you have turned in part one, you may not go back to it.

PART ONE - NO CALCULATORS ALLOWED

(1) Find each of the following:

(Note: answers to inverse trig. problems should be in radians, not degrees)

(a) $\sin^{-1}(-1) =$ _____

(b) $\tan^{-1}(0) =$ _____

(c) $\tan^{-1}\left(-\frac{1}{\sqrt{3}}\right) =$ _____

(d) $\sin^{-1}\left(\frac{1}{2}\right) =$ _____

(e) $\tan 330^\circ =$ _____

(f) $\cos^{-1}\left(\frac{-\sqrt{2}}{2}\right) =$ _____

(g) $\sec\left(\frac{5\pi}{6}\right) =$ _____

(h) $\csc(\pi) =$ _____

i) $\cos^{-1}\left(\cos\left(\frac{3\pi}{2}\right)\right) =$ _____

(j) $\tan\left(\tan^{-1}(1/3)\right) =$ _____

(2) Fill in the blank to complete the identity.

(a) $\sin 2\theta =$ _____

(b) $\cos^2 x =$ _____

(c) $\sin(\theta/2) =$ _____

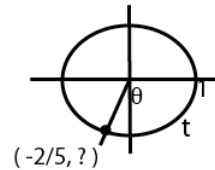
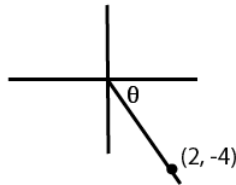
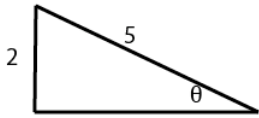
(d) $\cos(\alpha+\beta) =$ _____

MATH 8 – Sample Final Exam – Part Two

Fill in the blanks. In problems 1 - 7 fill in the blank with the most appropriate answer

- (1) True or false $\sin(-\theta) = -\sin(\theta)$ _____
- (2) In what quadrant(s) is $f(x) = \cot(x) > 0$ _____
- (3) $\begin{vmatrix} -5 & 3 \\ 2 & -7 \end{vmatrix} =$ _____
- (4) The period of $f(x) = \tan(3\pi x)$ is _____
- (5) The range of $f(x) = \sin^{-1}(x)$ is _____
- (6) To graph $f(x) = 2\sin(4x - \pi)$ we would shift the graph of $g(x) = 2\sin(4x)$ how far to the right _____
- (7) The range of $f(x) = \tan(x)$ is _____
- (8) How many solutions does the equation $\sin(\theta) = -0.2$ have for $0 \leq \theta \leq \pi$ _____

(9) Given the following figures, find:



- | | | |
|------------------------------------|------------------------------------|------------------------------------|
| (a) $\cos \theta =$ _____ | (c) $\sin \theta =$ _____ | (e) $\sin t =$ _____ |
| (b) $\theta \approx$ _____ degrees | (d) $\theta \approx$ _____ degrees | (f) $\theta \approx$ _____ degrees |

(10) Solve the following equations for the given restriction on t . (If no restriction is given, find all solutions)

- (a) Solve: $\csc(t) = -2$ for $0 \leq t < 2\pi$ _____
- (b) Solve: $\tan(t) = -\sqrt{3}$ _____
- (c) Solve: $\sin(t) = -\frac{\sqrt{2}}{2}$ for $-\frac{\pi}{2} \leq t < \frac{\pi}{2}$ _____

(11) Given the following matrices:

$$A = \begin{bmatrix} 2 & -1 \\ 3 & -5 \end{bmatrix} \quad B = \begin{bmatrix} 3 & 1 & 5 \\ 0 & 4 & 3 \\ 1 & -2 & 3 \end{bmatrix} \quad C = \begin{bmatrix} 1 & -3 \\ 3 & 7 \end{bmatrix}$$

Find the following, if possible. (If not possible, say so.)

(a) AB

(b) AC

(e) $\det(B)$

(12) SOLVE the following equations: $0 \leq x < 2\pi$

(a) $\sin 2x = 3 \sin x$

(b) $\cos^2(3x) - 1 = 0$

(13) Given $\csc \alpha = -5/4$, $\pi < \alpha < \frac{3\pi}{2}$, and $\beta = \sin^{-1}(2/3)$,

Find:

a) $\sin\left(\frac{\alpha}{2}\right)$

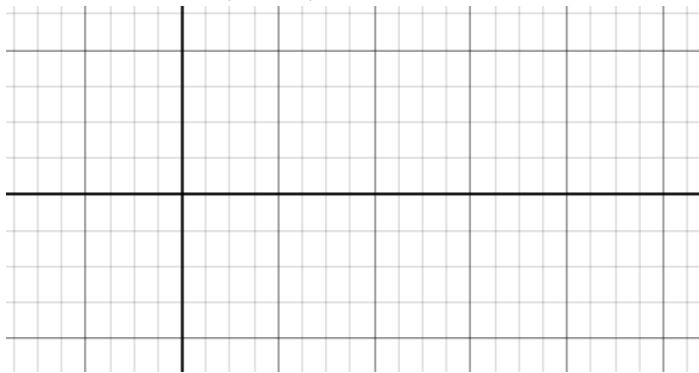
b) $\tan 2\beta$

c) $\cos(\alpha + \beta)$

(14) Verify the identity : $\frac{1 - \sin \theta}{\cos \theta} + \frac{\cos \theta}{1 - \sin \theta} = 2 \sec \theta$

(15) Sketch the following graph. (clearly show scale, graph at least one period, label coordinates of highs and lows)

$$f(x) = 2 \sin \left(3x - \frac{\pi}{4} \right)$$



(16) Use Gaussian Elimination to solve:
(no credit if requested method is not used)

$$\begin{cases} 3x - y - z = 8 \\ x + y - 2z = 5 \\ 2x - y + z = 1 \end{cases}$$

Find all solutions to the following equations.

(21) $3 \tan^2 x - \sec^2 x - 5 = 0$

(22) $\cos(2x) = 2 + 5\cos x$

- (23) A man looks up and sees an airplane flying in his direction at a level altitude of 2 miles. He watches the airplane for a few minutes. During that period of time he notices that the angle of elevation to the airplane changes from 45° to 60° . How far has the plane traveled in that time?

- (24) You do not need the exact answer, but your answer must match the exact answer to 3 decimal places.

Cable Car A steep mountain is inclined 74° to the horizontal and rises 3400 ft above the surrounding plain. A cable car is to be installed from a point 800 ft from the base to the top of the mountain, as shown. Find the shortest length of cable needed.

