Math 1321 Trignometry Spring 2013 Final Exam Version A

Calculators are not allowed on the multiple choice portion of the exam. Show work in your blue book to ensure a chance for partial credit.

1) An angle measuring $5\pi/4$ radians has what measure in degrees?

a) 144° b) 150° c) 315° d) 225°

2) An angle A in standard position has the point (-5, 12) on its terminal side. Then cos(A) equals:

a) -5 b) -5/13 c) 12/13 d) -12/5

3) Give the exact value of tan(120°).

a) $\sqrt{3}$

b) $-\sqrt{3}$

c) $\frac{\sqrt{3}}{3}$

d) $-\frac{\sqrt{3}}{3}$

e) None of these

4) The least positive measure of an angle coterminal with an angle of measure -400° is

a) 320°

b) 40°

c) 220°

d) 140°

e) None of these

5) Which *one* of the following is NOT POSSIBLE?

a) $\cot(\alpha) = \sqrt{2}$ b) $\sec(\alpha) = 0.5$ c) $\csc(\alpha) = -4$ d) $\tan(\alpha) = 10$

6) Which of the following is equal to $\sin(57^\circ)$?

a) cos(123°) b) sin(-57°) c) cos(33°) d) sin(237°)

7) Find the angle A for which sec(A) = -2.

a) $-\pi/3$

b) $2\pi/3$

c) $5\pi/6$

d) $11\pi/6$

e) None of these

8) A point P is on a circle with radius 10 cm, and ray OP is rotating with angular speed $\pi/18$ radians per second. What is the distance traveled by point P in 12 seconds?

a) 15π cm

b) 10/3 cm

c) $10\pi/9$ cm

d) $20\pi/3$ cm

e) None of these

9) Which of the following functions has period = $\pi/2$ and phase shift = $3/4$?

a) $y = \sin(2x - 3)$
b) $y = \sin(3x - 4)$
c) $y = \sin(4x - 3)$
d) $y = \sin(0.5x - 3)$
e) None of these

10) Which of the following is an asymptote of $y = \tan(2x)$?

a) $x = \pi/4$
b) $x = \pi/2$
c) $x = 2\pi$
d) $x = 4\pi$
e) None of these

11) The exact value of $\dfrac{2\tan(\pi/8)}{1 - \tan^2(\pi/8)}$ is

a) $\sqrt{3}$
b) $\sqrt{3}/3$
c) $\dfrac{1 - \sqrt{3}}{2}$
d) 1
e) None of these

12) Find the exact value of $y = \arcsin(-1)$.

a) π b) $3\pi/2$ c) $-\pi/6$ d) $-\pi/2$

13) Give the exact value of the expression sin (arctan 2)

a) $\dfrac{2\sqrt{5}}{5}$ b) $\dfrac{5\sqrt{2}}{2}$ c) $5\sqrt{2}$ d) $2\sqrt{5}$

14) Which of the following is equal to $\langle -2, 5 \rangle \cdot \langle 4, 2 \rangle$?

a) 2
b) $\sqrt{164}$
c) $\langle -8, 10 \rangle$
d) $\langle 2, 7 \rangle$
e) None of these

15) If $\mathbf{u} = \langle 3, -2 \rangle$ and $\mathbf{v} = \langle 6, -1 \rangle$, which of the following is equal to $2\mathbf{u} - 3\mathbf{v}$?

a) -13
b) -19
c) $\langle -12, -1 \rangle$
d) $\langle -12, -7 \rangle$
e) None of these

Formula Sheet for Math 1321 Final Exam Spring 2013

Sum and Difference Formulas

$$\cos(A+B) = \cos A \cos B - \sin A \sin B$$

$$\cos(A-B) = \cos A \cos B + \sin A \sin B$$

$$\sin(A+B) = \sin A \cos B + \cos A \sin B$$

$$\sin(A-B) = \sin A \cos B - \cos A \sin B$$

$$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

$$\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

Law of Sines

In triangle ABC with sides a, b, c:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Law of Cosines

In triangle ABC with sides a, b, c:

$$a^2 = b^2 + c^2 - 2bc\cos A$$

$$b^2 = a^2 + c^2 - 2ac\cos B$$

$$c^2 = a^2 + b^2 - 2ab\cos C$$

Double Angle Formulas

$$\cos(2A) = \cos^2 A - \sin^2 A = 2\cos^2 A - 1 = 1 - 2\sin^2 A$$

$$\sin(2A) = 2\sin A \cos A$$

$$\tan 2A = \frac{2\tan A}{1 - \tan^2 A}$$

Half-Angle Formulas

$$\cos\left(\frac{A}{2}\right) = \pm\sqrt{\frac{1+\cos A}{2}}$$

$$\sin\left(\frac{A}{2}\right) = \pm\sqrt{\frac{1-\cos A}{2}}$$

$$\tan\left(\frac{A}{2}\right) = \pm\sqrt{\frac{1-\cos A}{1+\cos A}} = \frac{\sin A}{1+\cos A} = \frac{1-\cos A}{\sin A}$$

Short Answer Problems:

Please show all work and answers in your blue book.
Do not use a calculator on the problems that require exact values.

16. A wire is to be stretched from the top of a 15 ft-tall pole to the top of a 25 ft-tall tower. The wire will make a 15° angle with the horizontal. How long must the wire be?

17. Solve the equation $\cos(2x) = \cos(x)$ for all x in $[0, 2\pi)$. Give *exact* solutions, in radians.

18. Verify the identity: $\dfrac{\cos\theta}{1+\sin\theta} + \dfrac{\sin\theta}{\cos\theta} = \sec\theta$

19. Sketch a graph of $y = 1 + 2\sin(2x)$ over one full period (where x is in radians). Label coordinates of the tallest point on the graph and the lowest point on the graph, as well as the beginning and end of one cycle.

20. Given that $\cos A = -3/5$ with $\pi/2 < A < \pi$, determine the *exact* value of each of the following. Calculator answers will not be accepted.

a) $\cos(-A)$

b) $\cos(A - \pi/4)$

c) $\sin(A/2)$

21. The length of the sides of oblique triangle ABC are $a = 10.4$ m, $b = 12.9$ m, and $c = 15.4$ m. Find the measure of angle A. Round your answer to the nearest degree.

22. Points A and B are on opposite sides of a canyon. To measure the distance AB across a canyon, a surveyor measures angles B and C and the distance BC, as shown in the figure. Find the distance from A to B, to the nearest tenth.