Math 1316 - Final Exam - Spring 19

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Name:

Section:

MULTIPLE CHOICE SECTION. (5 pts each) Choose the correct answer for each question. Select one choice only. No work will be graded. No partial credit.

Write the following as an algebraic expression in u, u > 0.

1) cos(arctan u) 1) _____

A) $\frac{\sqrt{u^2 - 1}}{u^2 - 1}$ B) $\frac{\sqrt{u^2 + 1}}{u^2 + 1}$ C) $u\sqrt{u^2 + 1}$ D) $\frac{u\sqrt{u^2 + 1}}{u^2 + 1}$

Solve the problem.

2) The optimal angle of elevation θ that a shot-putter should aim for in order to throw the greatest distance depends on the velocity v of the throw and the initial height h of the shot. One model for θ that achieves this maximum distance is $\theta = \sin^{-1}\left(\sqrt{\frac{v^2}{2v^2 + 64h}}\right)$. Suppose a shot-putter can consistently release the steel ball with velocity of 40 feet per second from an initial height h of 5.7 feet. What angle, to the nearest degree, will maximize the distance? 2) _____

A) 64° B) 68° C) 42° D) 46°

Solve the equation (x in radians and θ in degrees) for all exact solutions where appropriate. Round approximate answers in radians to four decimal places and approximate answers in degrees to the nearest tenth.

3) $2\sin^2 x + \sin x = 1$ 3) _____

A) $\left\{\frac{\pi}{6} + 2n\pi, \frac{3\pi}{2} + 2n\pi\right\}$ B) $\left\{\frac{\pi}{2} + 2n\pi, \frac{5\pi}{6} + 2n\pi, \frac{3\pi}{2} + 2n\pi\right\}$

C) $\left\{\frac{\pi}{6} + 2n\pi, \frac{5\pi}{6} + 2n\pi, \frac{3\pi}{2} + 2n\pi\right\}$ D) $\left\{\frac{\pi}{6} + 2n\pi, \frac{5\pi}{6} + 2n\pi\right\}$

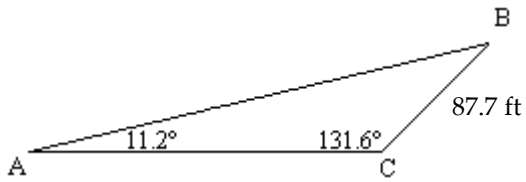
4) $\sin^2 x + \sin x = 0$ 4) _____

A) $\left\{n\pi, \frac{\pi}{2} + 2n\pi\right\}$ B) $\left\{n\pi, \frac{3\pi}{2} + 2n\pi\right\}$

C) $\left\{\frac{3\pi}{2} + n\pi\right\}$ D) $\left\{\frac{\pi}{2} + 2n\pi\right\}$

Solve the triangle. Round to the nearest tenth when necessary or to the nearest minute as appropriate.

5) 5) _____



A) B = 37.2°, b = 337.6 ft, c = 273 ft
B) B = 37.2°, b = 273 ft, c = 337.6 ft
C) B = 37.2°, b = 28.2 ft, c = 22.9 ft
D) B = 36.8°, b = 270.5 ft, c = 337.6 ft

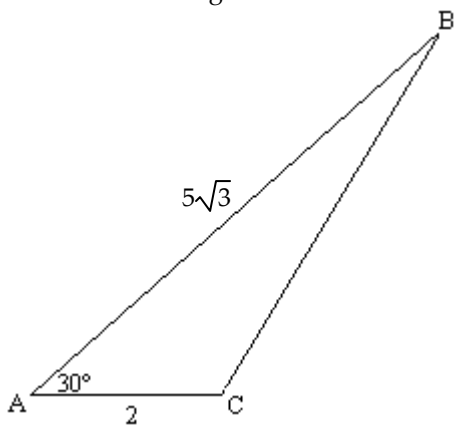
Find the area of triangle ABC with the given parts. Round to the nearest tenth when necessary.

6) A = 28.9° 6) _____
b = 10.3 in.
c = 6.8 in.

A) 30.7 in.^{2} B) 14.9 in.^{2} C) 32.7 in.^{2} D) 16.9 in.^{2}

Find the indicated angle or side. Give an exact answer.

7) Find the exact length of side a. 7) _____



A) 7 B) 9 C) $\sqrt{109}$ D) $\sqrt{47}$

Use an identity to write the expression as a single trigonometric function or as a single number.

8) sin 8x cos 8x 8) _____

A) cos 4x B) $\frac{1}{2}$ sin 16x C) 2 sin 4x D) cos 8x

Use identities to find the indicated value for each angle measure.

9) tan $\theta = \frac{7}{24}$, sin $\theta < 0$ Find cos(2θ). 9) _____

A) $\frac{336}{625}$ B) $-\frac{336}{625}$ C) $-\frac{527}{625}$ D) $\frac{527}{625}$

Using a sum or difference identity, write the following as an expression involving functions of x.

10) $\sin\left(\frac{\pi}{4} - x\right)$ 10) _____

A) $-\cos x$

B) $\frac{\sqrt{2}}{2}\cos x - \frac{\sqrt{2}}{2}\sin x$

C) $\sin x$

D) $\frac{\sqrt{2}}{2}\cos x + \frac{\sqrt{2}}{2}\sin x$

Find the exact value of the expression using the provided information.

11) Find $\cos(s - t)$ given that $\cos s = -\frac{4}{5}$, with s in quadrant II, and $\cos t = \frac{12}{13}$, with t in quadrant IV. 11) _____

A) $\frac{63}{65}$ B) $-\frac{33}{65}$ C) $-\frac{63}{65}$ D) $\frac{33}{65}$

Use the fundamental identities to simplify the expression.

12) $\frac{\sin x \cos x}{\tan x}$ 12) _____

A) $\sin^2 x$ B) $\cos^2 x$ C) $\cos x$ D) $\sin x$

SHORT ANSWER SECTION. (5 pts each) Write the answer in the box. Write the FINAL ANSWER ONLY. No work will be graded. No partial credit.

13) $\cos(-x)\cos x - \sin(-x)\sin x$ 13) _____

Give the exact value of the expression.

14) $\cos\left(2 \arcsin \frac{1}{4}\right)$ 14) _____

Solve the problem.

15) The range r of a projectile is given by 15) _____

$r = \frac{1}{32}v^2 \sin 2\theta,$

where v is the initial velocity and θ is the angle of elevation. If r is to be 3000 ft and v = 2000 ft/sec, what must the angle of elevation be? Give your answer in degrees to the nearest hundredth.

Use an identity to write the expression as a single trigonometric function or as a single number.

16) $\frac{\sin 22°}{1 + \cos 22°}$ 16) _____

Use identities to find the indicated value for each angle measure.

17) $\cos 2\theta = -\frac{3}{8}$ and $\frac{\pi}{2} < \theta < \pi$ Find $\sin \theta$. 17) _____

Perform the indicated operations and simplify the result so there are no quotients.

18) $\frac{\sin \theta}{1 + \sin \theta} - \frac{\sin \theta}{1 - \sin \theta}$ 18) _____

ESSAY. (5 pts each) Show all work to justify your answer. Answer with no work or insufficient work will receive no credit. Partial credit may be given.

Find the missing parts of the triangle. Round to the nearest tenth when necessary or to the nearest minute as appropriate.

19) $C = 113.6°$

$a = 7.5$ m

$b = 9.6$ m

Solve the equation for solutions in the interval [0°, 360°). Round to the nearest degree.

20) $\sqrt{3} \sec 2\theta = 2$

1) B
2) C
3) C
4) B
5) B
6) D
7) A
8) B
9) D
10) B
11) C
12) B
13) 1
14) $\frac{7}{8}$
15) 0.69°
16) tan 11°
17) $\sin\theta = \frac{\sqrt{11}}{4}$
18) $-2\tan^2\theta$
19) c = 14.4 m, A = 28.4°, B = 38°
20) {15°, 165°, 195°, 345°}