

Name: _____

GSI Name: _____

Section Time: _____

**MATH 32 FALL 2012
PRACTICE FINAL EXAM**

Total time: 2 hours, 50 minutes.

No books, notes, calculators, or electronic devices allowed.

Please show your work and provide explanations where appropriate.
If you need more space, you may use the backs of the pages or extra paper, but make a note that you did so.

Problem	Score	Out of
1		6
2		6
3		3
4		3
5		6
6		9
7		6
8		6
9		9
10		12
11		6
12		6
13		9
14		3
Total:		90

Angle sum, double angle, and half angle formulas:

$$\sin(u + v) = \sin(u) \cos(v) + \cos(u) \sin(v)$$

$$\cos(u + v) = \cos(u) \cos(v) - \sin(u) \sin(v)$$

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

$$\begin{aligned} \cos(2\theta) &= \cos^2(\theta) - \sin^2(\theta) \\ &= 1 - 2 \sin^2(\theta) \\ &= 2 \cos^2(\theta) - 1 \end{aligned}$$

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

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

- (1) You cut a slice from a circular pizza (centered at the origin) with radius 6" along radii at angles $\frac{\pi}{4}$ and $\frac{\pi}{3}$ with the positive horizontal axis.

(a) (3 points) What is the area of your slice?

(b) (3 points) What is the arc length of the outer portion of crust on your slice?

- (2) (6 points) Find all values of θ in the interval $[0, 2\pi]$ satisfying

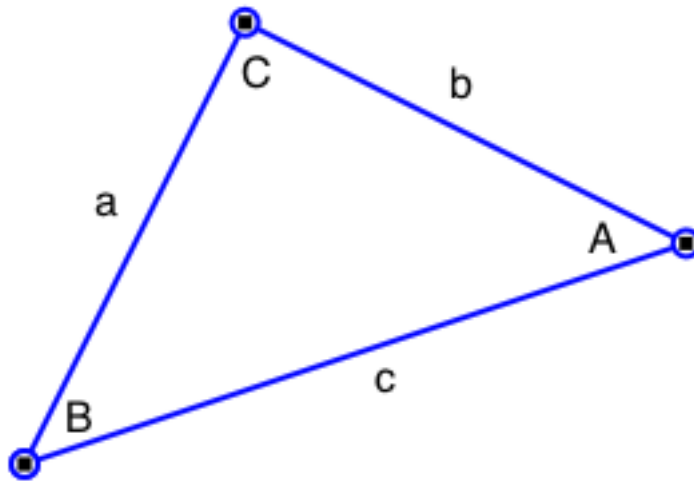
$$\sin^2(\theta) + \frac{1}{2} \cos(\theta) = 1$$

.

- (3) (3 points) Find an equation for the line perpendicular to $y = \frac{1}{3}x + 7$ through the point $(8, 26)$.

- (4) (3 points) What is $\frac{\pi}{10}$ radians in degrees?

(5) In the triangle below, let $A = \frac{\pi}{6}$, $B = \frac{\pi}{8}$, and $a = 5$.



(a) (3 points) Find $\sin(B)$.

(b) (3 points) Find b .

(6) Consider the rational function

$$f(x) = \frac{x^2 - 7x + 12}{3x^2}$$

(a) (3 points) Does f have a horizontal asymptote? If so, what is it?

(b) (6 points) Solve the inequality $f(x) \leq 0$.

(7) (6 points) Simplify the following expression:

$$e^{\frac{1}{2} \ln(x+3) - 2 \ln(x+1)}.$$

(8) (6 points) Show that for all θ , $\sin(3\theta) = 3 \sin(\theta) - 4 \sin^3(\theta)$.

(9) (a) (3 points) Find an equation for a circle with center $(2, -3)$ and radius 5.

(b) (3 points) What is the circumference of this circle?

(c) (3 points) What is its area?

- (10) Consider the function $f(x) = 2 \cos(2\pi x) + 2$.
- (a) (6 points) Sketch a graph of this function. Clearly label the y -intercept and several x -intercepts.

(b) (3 points) What is the amplitude of this function?

(c) (3 points) What is the period of this function?

(11) (6 points) Sketch a graph of $y = |x - 1| + |x + 1|$. *Hint:* Write this as a piecewise function with three cases.

(12) You put \$50 in a bank account with 8% interest compounded 4 times per year.

(a) (3 points) Write down an expression for the amount of money you will have after t years.

(b) (3 points) After how many years will you have \$80?

(13) Evaluate the following:

(a) (3 points) $\cos(\cos^{-1}(.8))$

(b) (3 points) $\sin^{-1}(\sin(\frac{13\pi}{16}))$

(c) (3 points) $\cos(\tan^{-1}(\frac{7}{5}))$

(14) (3 points) Find $\log_{16}(32)$.