Name: _____

GSI Name: _____

Section Time: _____

MATH 32 FALL 2012
FINAL EXAM

Start time: 7:10pm; End time: 10:00pm

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

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 please make a note that you did so.

Problem	Score	Out of
1		6
2		6
3		6
4		6
5		6
6		6
7		6
8		6
9		6
10		6
11		6
12		6
13		6
14		6
15		6
Total:		90

Angle sum, double angle, and half angle formulas:

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

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

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

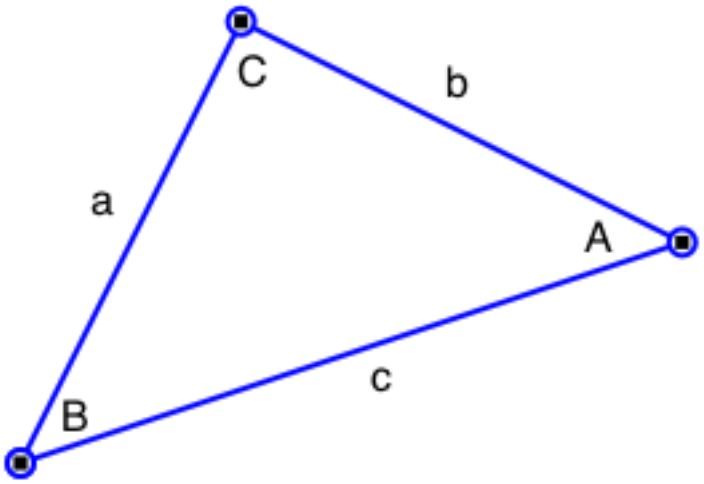
$$\begin{aligned}\cos(2\theta) &= \cos^2(\theta) - \sin^2(\theta)\\ &= 1 - 2\sin^2(\theta)\\ &= 2\cos^2(\theta) - 1\end{aligned}$$

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

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

(1) (6 points) Solve the equation $|x-1| = 3$.

(2) In the triangle below, let $a = 4$, $b = 2$, and $c = \sqrt{22}$.



(a) (3 points) Find $\cos(C)$.

(b) (3 points) Find the area of the triangle.

(3) (6 points) Sketch a graph of $y = x^4 + 3x^3 + 2x^2$. Label the x-intercepts.

(4) (6 points) Solve the equation $2^x = 8^{2x-4}$.

(5) (6 points) Find two points (x, y) on the line $y = 2x + 3$ which are at distance 3 from the origin $(0, 0)$.

(6) (6 points) Suppose that $\sin(\theta) = -\frac{2}{3}$ and $\frac{3\pi}{2} < \theta < 2\pi$. Find $\cos(\frac{\theta}{2})$.

(7) (6 points) Suppose a bank promises that money placed in a certain account will triple in 20 years. Assuming that interest is compounded continuously, what interest rate must the bank offer to make good on their promise?

(8) (6 points) Show that for all θ, $\tan(\theta)\sin(\theta) = \sec(\theta) - \cos(\theta)$.

(9) (6 points) Find all values of x satisfying

$$\sin^{-1}(x) = \cos^{-1}\left(\frac{2}{3}\right) + \frac{\pi}{3}.$$

Express your answer without using any trig or inverse trig functions.

(10) (6 points) Find the vertex of the parabola given by $y = 2x^2 + 8x + 9$.

(11) Let $f(x) = 3\ln(x) + \ln(\frac{1}{x})$.

(a) (3 points) What are the domain and range of f? To find the range, it may be helpful to simplify the formula for f a bit.

(b) (3 points) Find a formula for f^{-1}.

(12) You rest a 6-foot-tall ladder against a 4-foot-tall fence so that the top of the ladder meets the top of the fence.

(a) (3 points) What angle does the ladder make with the ground?

(b) (3 points) How far away from the base of the wall is the base of the ladder?

(13) (6 points) What is 3° in radians?

(14) (6 points) Find the domain of the following function:

$$f(x) = \frac{\sqrt{2+x}}{\ln(1-x)}.$$

(15) (6 points) Give an example of a periodic function with amplitude $\frac{1}{2}$ and period 3 whose graph goes through the point $(0, 2)$.