NAME: _____

MATH 130 **FINAL EXAM** Fall 2012 FORM A

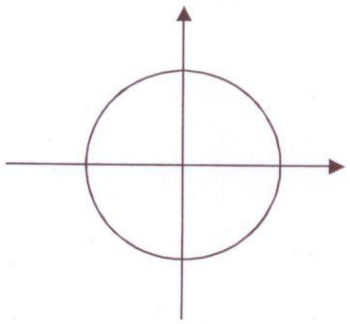
Part I: The following ten questions are worth 6 points each

1. If $f(x)=3x^2-x+2$, $g(x)=2x-3$. compute and simplify f o g (x) = ?

2. If $t=-\frac{5\pi}{6}$,

(a) Draw the terminal point on the unit circle and find the reference number for t

(b) Find the exact value of the six trigonometric functions for t



3. If $\tan t = -3$ and $\sin t > 0$, find the exact value of $\cos t$.

4. Find the domain of $f(x) = \dfrac{\sqrt{5x+4}}{2x}$.

5. Solve the inequality $x^2 + 2x - 15 \leq 0$. Write your answer in interval notation

6. Prove the identity: $\csc t - \sin t = \cos t \cot t$

7. Sketch one period of the graph $y = -30\cos(4x - \pi)$. Label the lowest points, the highest points and the x-intercepts of the graph with their coordinates.

8. A triangle has the following sides: a = 41.4ft, b = 33.6 ft, c = 58.3 ft. Find the measure of its smallest angle only (round off to one decimal place).

9. If $\cos x = \frac{12}{13}$, (x in quadrant IV) use suitable identities to find the exact value of sin 2x. Write your answer as a fraction.

10. Simplify: (a) $\sin\left(\tan^{-1}\frac{x}{3}\right)$ (b) $\sin^{-1}\left(\sin\left(\frac{7\pi}{6}\right)\right)$

Part II: The next five questions are worth 8 points each

11. If $f(x)=\dfrac{x(x+3)}{4x^2-1}$ find:

(a) the coordinates of the x-intercept(s): _____

(b) the coordinates of the y-intercept: _____

(c) the equation of the vertical asymptote(s): _____

(d) the equation of the horizontal asymptote: _____

(e) sketch the graph of f together with all the points and lines found above:

12. Find all solutions for x in the interval $[0,2\pi)$: $4\sin^2 x-1=0$

13. If $f(x)=x^3-5x^2+11x-15$

(a) Give a complete list of all possible rational zeros:

(b) Use synthetic division to check for actual rational zeros:

(c) Find all remaining zeros:

(d) Write f as a product of linear factors:

f(x) = _____

14. If $y=2x^2-4x-1$,

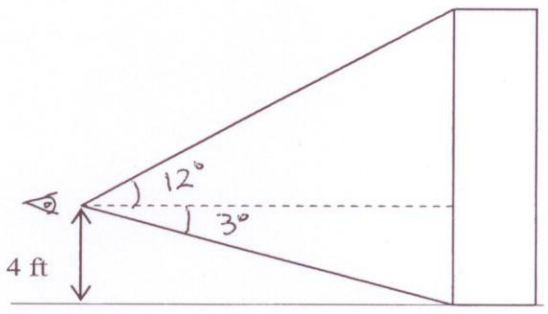
(a) Rewrite the function in the form $y=c(x-h)^2+k$ or $y-k=c(x-h)^2$

(b) Use part (a) to find the vertex of the graph

(c) Find the y-intercept and the x-intercepts of the graph

15. A surveyor is measuring a building with an eyepiece 4 feet from the ground. From where the surveyor is looking, the angle of elevation of the top of the building is 12°; the angle of depression of foot of the building is 3°. What is the height of the building to the nearest foot:

height = _____



FUNDAMENTAL IDENTITIES

$$\sec x = \frac{1}{\cos x} \qquad \csc x = \frac{1}{\sin x}$$

$$\tan x = \frac{\sin x}{\cos x} \qquad \cot x = \frac{1}{\tan x}$$

$$\sin^2 x + \cos^2 x = 1 \qquad 1 + \tan^2 x = \sec^2 x \qquad 1 + \cot^2 x = \csc^2 x$$

$$\sin(-x) = -\sin x \qquad \cos(-x) = \cos x \qquad \tan(-x) = -\tan x$$

COFUNCTION IDENTITIES

$$\sin\left(\frac{\pi}{2} - x\right) = \cos x \qquad \cos\left(\frac{\pi}{2} - x\right) = \sin x$$

$$\tan\left(\frac{\pi}{2} - x\right) = \cot x \qquad \cot\left(\frac{\pi}{2} - x\right) = \tan x$$

$$\sec\left(\frac{\pi}{2} - x\right) = \csc x \qquad \csc\left(\frac{\pi}{2} - x\right) = \sec x$$

REDUCTION IDENTITIES

$$\sin(x + \pi) = -\sin x \qquad \sin\left(x + \frac{\pi}{2}\right) = \cos x$$

$$\cos(x + \pi) = -\cos x \qquad \cos\left(x + \frac{\pi}{2}\right) = -\sin x$$

$$\tan(x + \pi) = \tan x \qquad \tan\left(x + \frac{\pi}{2}\right) = -\cot x$$

ADDITION AND SUBTRACTION FORMULAS

$$\sin(x + y) = \sin x \cos y + \cos x \sin y$$

$$\sin(x - y) = \sin x \cos y - \cos x \sin y$$

$$\cos(x + y) = \cos x \cos y - \sin x \sin y$$

$$\cos(x - y) = \cos x \cos y + \sin x \sin y$$

$$\tan(x + y) = \frac{\tan x + \tan y}{1 - \tan x \tan y} \qquad \tan(x - y) = \frac{\tan x - \tan y}{1 + \tan x \tan y}$$

DOUBLE-ANGLE FORMULAS

$$\sin 2x = 2 \sin x \cos x \qquad \cos 2x = \cos^2 x - \sin^2 x$$

$$= 2\cos^2 x - 1$$

$$\tan 2x = \frac{2 \tan x}{1 - \tan^2 x} \qquad = 1 - 2\sin^2 x$$

FORMULAS FOR REDUCING POWERS

$$\sin^2 x = \frac{1 - \cos 2x}{2} \qquad \cos^2 x = \frac{1 + \cos 2x}{2}$$

$$\tan^2 x = \frac{1 - \cos 2x}{1 + \cos 2x}$$

HALF-ANGLE FORMULAS

$$\sin\frac{u}{2} = \pm\sqrt{\frac{1 - \cos u}{2}} \qquad \cos\frac{u}{2} = \pm\sqrt{\frac{1 + \cos u}{2}}$$

$$\tan\frac{u}{2} = \frac{1 - \cos u}{\sin u} = \frac{\sin u}{1 + \cos u}$$

PRODUCT-TO-SUM AND SUM-TO-PRODUCT IDENTITIES

$$\sin u \cos v = \tfrac{1}{2}[\sin(u + v) + \sin(u - v)]$$

$$\cos u \sin v = \tfrac{1}{2}[\sin(u + v) - \sin(u - v)]$$

$$\cos u \cos v = \tfrac{1}{2}[\cos(u + v) + \cos(u - v)]$$

$$\sin u \sin v = \tfrac{1}{2}[\cos(u - v) - \cos(u + v)]$$

$$\sin x + \sin y = 2 \sin\frac{x + y}{2} \cos\frac{x - y}{2}$$

$$\sin x - \sin y = 2 \cos\frac{x + y}{2} \sin\frac{x - y}{2}$$

$$\cos x + \cos y = 2 \cos\frac{x + y}{2} \cos\frac{x - y}{2}$$

$$\cos x - \cos y = -2 \sin\frac{x + y}{2} \sin\frac{x - y}{2}$$

THE LAWS OF SINES AND COSINES

The Law of Sines

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

The Law of Cosines

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

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

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