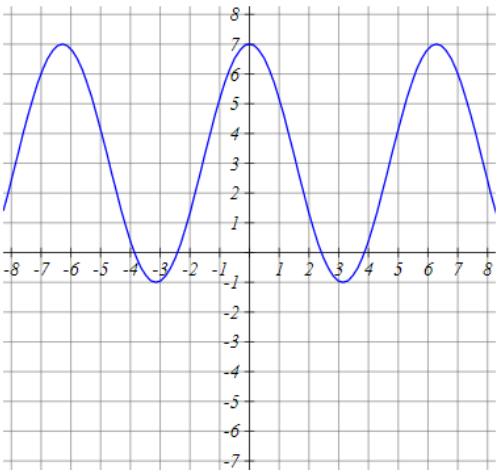
NAME:_____ / 60 = %

MATH 127 FINAL EXAM SAMPLE

NOTE: The actual exam will only have 14 questions. The different parts of each question (part A, B, etc.) are variations. Know how to do all the variations on this exam.

1A.) (4 points) Choose which function best represents the trigonometric graph below.



(A) $y = 4\sin x + 3$

(B) $y = 4\cos x + 3$

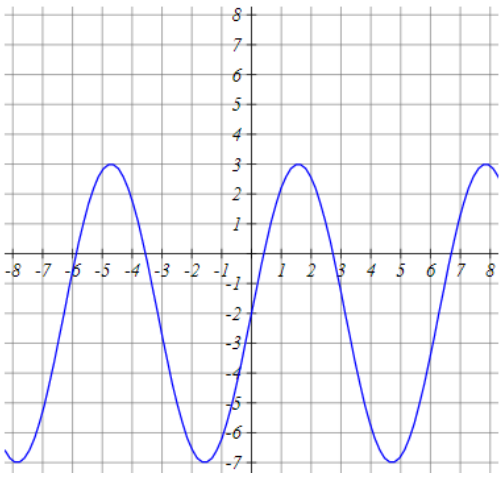
(C) $y = 5\sin x + 3$

(D) $y = 4\cos x$

(E) $y = 5\cos x + 3$

(F) $y = 4\cos x + 2$

1B.) (4 points) Drawn on the coordinate system below is one period of the graph of which equation?



(A) $y = 6\sin x - 2$

(B) $y = 5\sin x - 3$

(C) $y = 5\sin x$

(D) $y = 5\sin x - 2$

(E) $y = 6\cos x - 2$

(E) $y = 5\cos x - 2$

2A.) (3 pts) What is the graph of the polar equation $r = 81\tan\theta\sec\theta$?

(A) a line

(B) an ellipse

(C) a parabola

(D) a circle

(E) a hyperbola

2B.) (3 pts) What is the graph of the polar equation $r = 3.4$?

(A) a parabola

(B) a circle

(C) a line

(D) a hyperbola

(E) an ellipse

3A.) (5 pts) Establish the identity: $\cos x \cot x + \sin x = \csc x$

3B.) (5 pts) Establish the identity: $\dfrac{1+\sin\theta}{1-\sin\theta}-\dfrac{1-\sin\theta}{1+\sin\theta}=4\tan\theta\sec\theta$

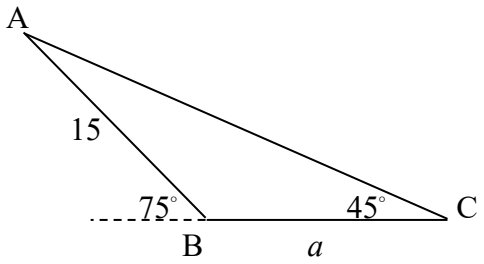
4A.) (5 pts) Solve for θ on the interval $[0,2\pi)$: 4A._____

$\left(2\cos\theta-\sqrt{3}\right)\left(\sin^2\theta-1\right)=0$

4B.) (5 pts) Solve for θ on the interval $[0,2\pi)$: 4B._____

$\cot x+2\cos x\cot x=0$

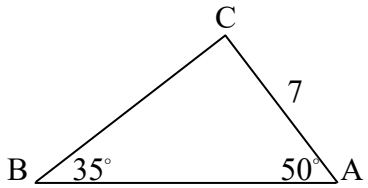
5A.) (4 pts) In the figure below, find the following:



a:_____
(Write the exact value.)

$m\angle A$:_____

5B.) (4 pts) In the figure below, find the following:



a:_____
(Round to two decimal places.)

$m\angle C$:_____

6A.) (4 pts) Given the vector $u = \langle -3, 8 \rangle$ and $v = \langle -9, -6 \rangle$, find the dot product $u \cdot v$.

6A._____

6B.) (4 pts) Given the vector $u = \langle -7, 3 \rangle$ and $v = \langle 4, 8 \rangle$, find the dot product $u \cdot v$.

6B._____

7A.) (3 pts) Which equation's graph is an ellipse? (No partial credit on this one.)

(A) $2x^2 + 3x - 2y^2 + 4y = 0$

(B) $3x^2 + 7x + 4y^2 - 5y = 0$

(C) $2y^2 + 3x - 6y = 0$

(D) $9y + 8x - 4 = 0$

7B.) (3 pts) Which equation's graph is a parabola? (No partial credit on this one.)

(A) $3x^2 + 8x + 4y^2 + 2y = 0$

(B) $7x^2 - 4x - y^2 + 5y = 0$

(C) $3x^2 + 5x + 7y = 0$

(D) $4y - 9x + 3 = 0$

8A.) (4 pts) Find the exact value: $1+\tan^2\left(\frac{\pi}{6}\right)-\csc^2\left(\frac{\pi}{4}\right)$ 8A._____

8B.) (4 pts) Find the exact value: $3\cot^2\left(\frac{\pi}{3}\right)+2\cos\left(\frac{\pi}{6}\right)$ 8B._____

9A.) (5 pts) Find the following given:

$\sec\theta=-\frac{\sqrt{26}}{5}$ and $180^\circ<\theta<270^\circ$.

$\sin\theta$:_____ $\csc\theta$:_____

$\tan\theta$:_____ $\cot\theta$:_____

$\cos\theta$:_____

9B.) (5 pts) Find the following given:

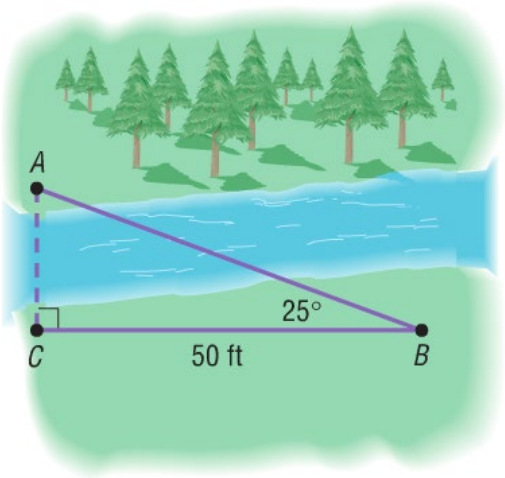
$\sin\theta = \frac{7}{25}$ and $\tan\theta < 0$.

$\cos\theta$:_____ $\sec\theta$:_____

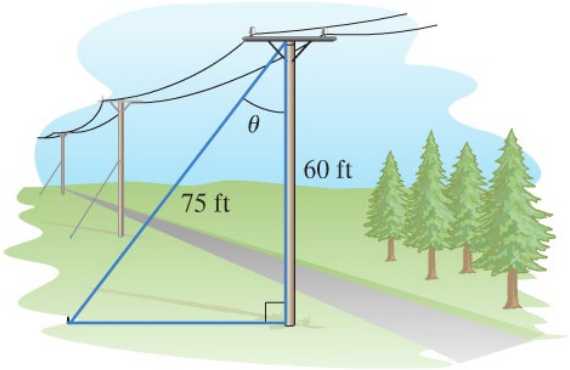
$\tan\theta$:_____ $\cot\theta$:_____

$\csc\theta$:_____

10A.) (4 pts) Find the distance from **A to C** in the figure below: 10A._____



10B.) (4 pts) Find the angle between the wire and the pole to the nearest degree. 10B._____



11A.) (5 pts) Use a right triangle to write $\sec\left(\sin^{-1}\left(\frac{x}{\sqrt{x^2+4}}\right)\right)$ as an algebraic expression. Assume that x is positive and that the given inverse trigonometric function is defined for the expression in x.

11A._____

11B.) (5 pts) Use a right triangle to write $\sin\left(\cos^{-1}(2x)\right)$ as an algebraic expression. Assume that x is positive and that the given inverse trigonometric function is defined for the expression in x.

11B._____

12A.) (5 pts) Verify the identity: $\sin 2\theta = \frac{2\cot\theta}{1+\cot^2\theta}$

12B.) (5 pts) Verify the identity: $\cot\theta - \sin 2\theta = \cot\theta \cos 2\theta$

13A.) (5 pts) Use a sum or difference formula to fully $\cos\left(\theta - \frac{3\pi}{2}\right)$. 13A._____

Evaluate when possible.

13B.) (5 pts) Use a sum or difference formula to fully $\frac{\sin\left(x + \frac{3\pi}{2}\right)}{\cos(\pi - x)}$. 13B._____

Evaluate when possible.

14A.) (4 pts) Convert the rectangular equation $x^2 y = 4$ into a **polar** equation that expresses *r* in terms of θ.

$r =$ _____

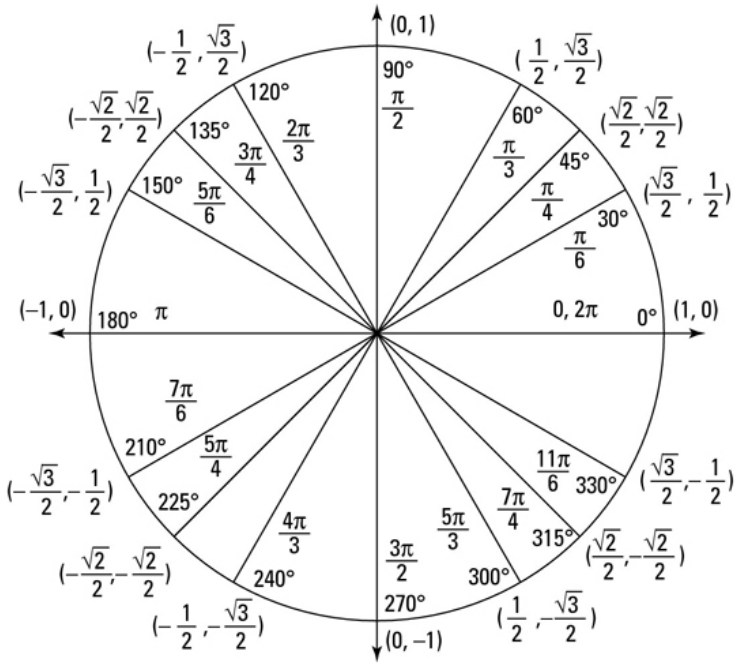
14B.) (4 pts) Convert the rectangular equation $(x-2)^2 + y^2 = 4$ into a **polar** equation that expresses *r* in terms of θ.

$r =$ _____

FORMULA SHEET

$\tan\theta = \dfrac{\sin\theta}{\cos\theta}$ $\quad$ $\cot\theta = \dfrac{\cos\theta}{\sin\theta}$

$\sec\theta = \dfrac{1}{\cos\theta}$ $\quad$ $\csc\theta = \dfrac{1}{\sin\theta}$



$\sin^2\theta + \cos^2\theta = 1$

$\sin^2\theta = 1 - \cos^2\theta$

$\cos^2\theta = 1 - \sin^2\theta$

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

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

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

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

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

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

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

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

$\cos(2\theta) = 2\cos^2\theta - 1$

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

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

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

$x = r\cos\theta$

$y = r\sin\theta$

If $u = \langle a_1, b_1 \rangle$ and $v = \langle a_2, b_2 \rangle$ then $u \cdot v = a_1 \cdot a_2 + b_1 \cdot b_2$

$r^2 = x^2 + y^2$

$r = \sqrt{x^2 + y^2}$