Math 121 Exam II Lowman Fall 2013

Calculators cannot be used. In all problems show your work, put a box around your answer and clearly label it. Put your name, your TA's name, your discussion time, and your UIN on **both pages** of the exam. You can show your clearly labeled work on the back of either sheet.

1. (a) Fill in all boxes of the table with EXACT values.

$\boldsymbol{\theta}$ degrees	$\boldsymbol{\theta}$ radians	$\mathbf{sin}(\boldsymbol{\theta})$	$\mathbf{cos}(\boldsymbol{\theta})$
0			
30			
45			
60			
90			

(b) In the boxes complete the trigonometric identities as given in lectures

left side of identity		right side of identity
$\mathbf{sin}(\boldsymbol{x}+\boldsymbol{y})$	$=$	
$\mathbf{cos}(\boldsymbol{x}+\boldsymbol{y})$	$=$	
$\mathbf{sin}(\mathbf{2}\boldsymbol{x})$	$=$	
$\mathbf{cos}(\mathbf{2}\boldsymbol{x})$	$=$	
$\mathbf{sin}(\boldsymbol{x}-\boldsymbol{\pi})$ in terms of $\mathbf{sin}(\boldsymbol{x})$	$=$	
half angle identity for $\mathbf{cos^2}(\boldsymbol{x})$	$=$	

Show clearly labeled work for problems 2, 3, 4 and 5 on the back of the exam sheets.

2. If $\mathbf{tan}(\boldsymbol{\theta}) = \frac{\mathbf{3}}{\mathbf{2}}$ and $\mathbf{cos}(\boldsymbol{\theta}) < \mathbf{0}$, find $\mathbf{sin}(\boldsymbol{\theta})$ and $\mathbf{cos}(\boldsymbol{\theta})$.

3. Find all solutions to:

$$\frac{\boldsymbol{log_9(7)}}{\boldsymbol{log_9(e)}} + \frac{\mathbf{1}}{\mathbf{5}} \cdot \mathbf{log_4}(\mathbf{4^5}) \cdot \boldsymbol{e}^{\boldsymbol{x}\cdot\mathbf{ln(9)}} - \mathbf{ln(7)} = \mathbf{9}^{(\mathbf{5}-\mathbf{6}/\boldsymbol{x})} \cdot \mathbf{ln}(\boldsymbol{e}) + \mathbf{ln(1)} \cdot \mathbf{cos}(\mathbf{2}\boldsymbol{x}+\mathbf{1})$$

4. Solve for $\boldsymbol{t}$ when $\boldsymbol{P}$ is **3** times $\boldsymbol{D}$:

$$\boldsymbol{P = \frac{D}{C \cdot e^{-rt} + 1}}$$

Show all steps and box your answer.

5. A wheel with radius $\boldsymbol{r = 15\ in}$ is rolling at a speed of $\boldsymbol{30\ ft/sec}$.

   (a) What is $\boldsymbol{\omega}$ the ***angular speed***, in **radians per second**?

   (b) Convert your answer to **rpms** (rotations per minute).

   Show all work, including units, for full credit. Give your answer in terms of $\boldsymbol{\pi}$ and reduce fractions when possible.
   $\boldsymbol{5280ft = 1mile}$, $\boldsymbol{1in = 2.54cm}$. $\boldsymbol{1km = 1000m}$, $\boldsymbol{1m = 100cm}$, $\boldsymbol{1\ rotation = 2\pi\ radians = 360\ degrees}$, $\boldsymbol{1min = 60sec}$.

6. Given $\boldsymbol{y = A\sin(\omega(x - x_0)) = A\sin(\omega x - \phi)}$ Find:

   - amplitude $\boldsymbol{A}$ = _____
   - period $\boldsymbol{T}$ = _____
   - angular frequency $\boldsymbol{\omega = \frac{2\pi}{T}}$ = _____
   - phase shift $\boldsymbol{x_0}$ = _____
   - phase constant $\boldsymbol{\phi}$ = _____
   - phase $\boldsymbol{\omega x - \phi}$ = _____