MATH 121 Quiz 4 Solution **Radford 11/01/02**

Name (print) ________________________ Tu/Th Discussion (circle) 12 1 2

***** If you use a calculator it must be your own. You must show your work. *****

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1. (12 points) Suppose that $\tan t = -\frac{5}{12}$ and $\cos t < 0$. Write $\sin t$, $\sec t$, and $\cot t$ as non-decimal fractions (example $\frac{1}{2}$ instead of 0.5).

Solution: Since $\tan t < 0$ and $\cos t < 0$ the terminal side of t lies in the second quadrant. A point on the terminal side of t is $(x, y) = (-12, 5)$. In this case $r = \sqrt{(-12)^2 + 5^2} = 13$. Thus (answers in boldface)

$$\sin \mathbf{t} = \frac{\mathbf{y}}{\mathbf{r}} = \frac{\mathbf{5}}{\mathbf{13}} \text{ } (\textbf{4 points}), \qquad \cos t = \frac{x}{r} = -\frac{12}{13}, \qquad \tan t = \frac{y}{x} = -\frac{5}{12}$$

and by taking reciprocals

$$\csc t = \frac{13}{5}, \qquad \sec \mathbf{t} = -\frac{\mathbf{13}}{\mathbf{12}} \text{ } (\textbf{4 points}), \qquad \cot \mathbf{t} = -\frac{\mathbf{12}}{\mathbf{5}} \text{ } (\textbf{4 points}).$$

2. (8 points) A periodic phenomenon is modeled by $f(t) = A\sin(bt + c)$. Suppose that the range of $f(t)$ is $[-12, 12]$, the function $f(t)$ has period 3π, and the phase shift is $\frac{\pi}{3}$. Find A, b, and c.

Solution: $A > 0$ should have been added. Thus $A = \pm 12$ (**2 points**) is ok. $3\pi = \frac{2\pi}{b}$ so $b = \frac{2}{3}$ (**3 points**). Since $\frac{\pi}{3} = -\frac{c}{b}$ it follows that $c = -\left(\frac{\pi}{3}\right) b = -\frac{2\pi}{9}$ (**3 points**).