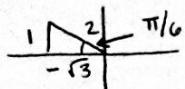


Quiz 8

September 28, 2016

Show all work and circle your final answer.

1. Evaluate $\arccos\left(-\frac{\sqrt{3}}{2}\right)$. Show work or explain your answer.



$$\arccos\left(-\frac{\sqrt{3}}{2}\right) = \boxed{\frac{5\pi}{6}}$$

2. Fill in the following chart. (No work required!)

$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
$\sin x$	$\cos x$	$\cos x$	$-\sin x$
$\sec x$	$\sec x \tan x$	$\csc x$	$-\csc x \cot x$
$\tan x$	$\sec^2 x$	$\cot x$	$-\csc^2 x$

3. Suppose that $f(x)$ is a differentiable function with $f(0) = 1$ and $f'(0) = 3$. Let $g(x) = \frac{\sec x}{f(x) \cos x}$. Find $g'(0)$.

$$g'(x) = \frac{f(x) \cos x (\sec x \tan x) - \sec x (f'(x) \cos x + f(x)(-\sin x))}{(f(x) \cos x)^2}$$

$$g'(0) = \frac{1 \cdot 1 \cdot 1 \cdot 0 - 1(3 \cdot 1 + 1 \cdot 0)}{(1 \cdot 1)^2} = \frac{0 - 3}{1} = \boxed{-3}$$

4. Evaluate $\lim_{x \rightarrow 0} \frac{\sin^2(3x)}{\tan^2(4x)}$.
- $$\begin{aligned}
 &= \lim_{x \rightarrow 0} \frac{\sin 3x}{1} \cdot \frac{\sin 3x}{1} \cdot \frac{\cos 4x}{\sin 4x} \cdot \frac{\cos 4x}{\sin 4x} \\
 &= \lim_{x \rightarrow 0} \frac{\sin 3x}{1} \cdot \frac{\sin 3x}{1} \cdot \frac{1}{\sin 4x} \cdot \frac{1}{\sin 4x} \quad (\text{since } \cos 0 = 1) \\
 &= \lim_{x \rightarrow 0} \frac{3x}{3x} \cdot \frac{\sin 3x}{1} \cdot \frac{3x}{3x} \cdot \frac{\sin 3x}{1} \cdot \frac{4x}{4x} \cdot \frac{1}{\sin 4x} \cdot \frac{4x}{4x} \cdot \frac{1}{\sin 4x} \\
 &= \lim_{x \rightarrow 0} \frac{3x \cdot 3x}{4x \cdot 4x} \quad (\text{since } \lim_{x \rightarrow 0} \frac{\sin x}{x} = 1) \\
 &= \boxed{\frac{9}{16}}
 \end{aligned}$$