

Quiz 1 will cover the following material: (all handouts posted on the web site so far)

- Differentiate functions using the constant rule, sum rule, constant multiplier rule, generalized power rule, product rule, quotient rule, and chain rule.
- Graph and state the basic properties of all trigonometric functions ( $\sin x$ ,  $\cos x$ ,  $\tan x$ ,  $\sec x$ ,  $\csc x$ ,  $\cot x$ ,  $\sin^{-1} x$ ,  $\cos^{-1} x$ ,  $\tan^{-1} x$ ,  $\sec^{-1} x$ ,  $\csc^{-1} x$ ,  $\cot^{-1} x$ .)
- Differentiate all twelve trigonometric functions (listed above)
- Solve any problem similar to those on the Are You Ready for Calculus worksheet

## Sample Quiz 1

1. Consider the function  $f(x) = \sin x$ . State its basic properties (domain, range, increasing/decreasing, asymptotes) and sketch its graph.
2. Simplify the expression  $\csc(\tan^{-1} x)$
3. Differentiate each of the following:
 

a) $f(x) = \sqrt{5x^4 + x^2 + 1}$	d) $f(t) = \sqrt[3]{t^5} - \frac{1}{t} + \tan t$	f) $h(\theta) = \sin^2 \theta + \cos^2 \theta$
b) $g(\theta) = \tan(3\theta^2)$	e) $g(x) = \sec\left(\frac{1}{3}x^4 + 1\right)$	g) $f(x) = \tan^{-1}(x^3)$
c) $m(x) = 10 \sin x \cos x$		
4. Express  $\cos 2x$  in terms of  $\sin x$ .
5.  $\frac{d}{dx}(\cot^{-1} x) = ?$  PROVE your answer.

## Answers

1. see handout on trigonometric functions
2.  $\frac{\sqrt{x^2 + 1}}{x}$
3. a)  $f'(x) = \frac{x + 10x^3}{\sqrt{x^2 + 5x^4 + 1}}$     b)  $g'(\theta) = 6\theta(\tan^2 3\theta^2 + 1)$     c)  $m'(x) = 10 \cos 2x$     d)  $\frac{5}{3t} \sqrt[3]{t^5} + \frac{1}{t^2} + \sec^2 t$   
 e)  $\frac{4}{3}x^3 \sec\left(\frac{1}{3}x^4 + 1\right) \tan\left(\frac{1}{3}x^4 + 1\right)$     f) 0    g)  $\frac{3x^2}{x^6 + 1}$
4.  $\cos 2x = 1 - 2 \sin^2 x$
5. see handout on differentiating trigonometric functions