MTH 132 Quiz 2
Due June 2 at the beginning of class

Name: Solutions

1. (5 points) Prove that

$$\frac{d}{dx}\csc x = -\csc x \cot x$$

$\frac{d}{dx}\csc x = \frac{d}{dx}\frac{1}{\sin x}$

quotient rule $= \dfrac{\sin x \frac{d}{dx}1 - 1\frac{d}{dx}\sin x}{\sin^2 x}$

$\frac{d}{dx}1 = 0$ $= -\dfrac{\cos x}{\sin^2 x}$

$= -\frac{1}{\sin x}\frac{\cos x}{\sin x}$

$= -\csc x \cot x.$

or

$= \frac{d}{dx}(\sin x)^{-1}$

$= -(\sin x)^{-2}\cdot \cos x$

by chain rule.

2. (5 points) The position of a particle is given by

$$s(t) = \sin^2(t) + 3$$

for $0 < t < \pi$.

(a) When does the particle have positive velocity?

(b) Is the acceleration at time $t = \pi/2$ positive, negative, or zero?

a) $v(t) = s'(t) = 2\sin t \cos t$

Since $\sin t > 0$ for $0 < t < \pi$ and

$\cos t > 0$, $0 < t < \pi/2$, $\cos t < 0$, $\pi/2 < t < \pi$,

v is negative for $\boxed{\pi/2 < t < \pi.}$

b) $a(\pi/2) = \left.\frac{dv}{dt}\right|_{t=\pi/2} = \left.2\sin t(-\sin t) + 2\cos t \cos t\right|_{\pi/2}$

$= 2\cos^2(\pi/2) - 2\sin^2(\pi/2)$

$= -2$ Negative