Math 105 - Quiz 3 - September 19, 2007

Instructions: Show all of your work and circle your final answers. Calculators are allowed, but notes and books are not.

1. (10 pts.) Suppose that the slope of the curve \( y = f(x) \) at \( x = 3 \) is \(-1\) and that \( f(3) = 2 \). Find the equation of the tangent line to the curve at the point \((3, 2)\).

\[
\text{Slope} = -1
\]
\[
p = (3, 2).
\]
\[
y - y_0 = m(x - x_0)
\]
\[
y - 2 = -1(x - 3)
\]
\[
y - 2 = -x + 3
\]
\[
y = -x + 5,
\]
\[
\text{the equation of the tangent line.}
\]

2. (10 pts.) Suppose that \( g'(x) \geq 3 \) for all \( x \geq 0 \) and that \( g(0) = 1 \). What can be said about \( g(4) \)? Explain.

The "speed limit law" says that if \( g'(x) \geq M \) for all \( x \) in \([a, b]\), then \( g(b) - g(a) \geq M(b-a) \), assuming \( b > a \).

We know about \( g(0) \) and want to know about \( g(4) \).
Since \( g'(x) \geq 3 \), we get
\[
g(4) - g(0) \geq 3(4 - 0),
\]
\[
\text{So } g(4) - 1 \geq 12,
\]
\[
\text{So } g(4) \geq 13.
\]