Math 150 Test 1 Fall 2010

Name: _____

CALCULATORS ALLOWED

1. [5 points] What is the domain of $\frac{x}{\sqrt{x-3}}$? Express your answer in interval notation.

2. [5 points] Find the exact value of $\csc^{-1} 2$. Express your answer in radians.

3. [10 points] Let $f(x) = x^2 + \sqrt{x}$. Find the equation in slope-intercept form of the line tangent to the graph of $y = f(x)$ at the point (4,18).

4. [20 points] Find the following limits. Show the steps you are using. Do not just plug in numbers.

a. $\lim_{x\to 0} \dfrac{\sin 2x}{\sin 4x}$

b. $\lim_{x\to 3} \dfrac{x^2+x-12}{x^2-2x-3}$.

c. $\lim_{x\to 0} \dfrac{x}{x+\tan x}$.

d. $\lim_{x\to\infty} \sqrt{9x^2+x}-3x$

5. [5 points] Let $f(x)$ and $g(x)$ be differentiable functions. Prove that $(f(x)+g(x))' = f'(x)+g'(x)$.

6. [30 points] Find the following derivatives.

a. $(x^2 \sin x)'$

b. $(x^4 - 2x^2 + 3\tan x)'$

c. $\left(\dfrac{7x+1}{x+3}\right)'$

d. $(\sqrt{x} \cdot \cos x)'$

e. $(\cot 3x)'$

f. $(\sin^3 x)'$

7. [15 points] Let $f(x) = \arctan\left(\frac{1}{x}\right)$. Find the following limits – use any method.

a. $\lim_{x \to 0^+} f(x)$

b. $\lim_{x \to 0^-} f(x)$

c. $\lim_{x \to \infty} f(x)$

d. $\lim_{x \to -\infty} f(x)$

e. Obviously $y = f(x)$ is discontinuous at $x = 0$. What type of discontinuity is this?

f. Graph $y = f(x)$. Label any asymptotes.

8. [10 points] Let $xy^2 - 2\sin(xy) = 4$. Find y' as a function of x and y.