Name: ______________________________

Section: ______________________________

Math 1571H. Derivatives Exam October 20, 2005

There are a total of 10 problems on this exam, weighted equally. In each case compute the derivative of the given function. It isn't necessary to simplify your answer unless specifically requested to do so. However it is important to display your answer in a clearly legible form.

1.

$$f(x) = \left[\sin(4x^3 - 8) - 5x\right]^{\frac{4}{3}}$$

2.

$$g(x) = \frac{x \tan x}{2x^2 - 8}$$

3.

$$f(x) = \left[\cos(2x^3)\right]\left[\sin^2(\frac{x}{4})\right]$$

4.

$$h(t) = \frac{\cos 3t}{(2t^3 + t)^{\frac{3}{2}}}$$

5. Given

$$g(x) = \frac{-2x^{\frac{5}{2}} + 3x^{\frac{3}{2}} + x}{x^{\frac{3}{2}}},$$

find $g'(x)$. Simplify your answer.

6.

$$f(x) = \cos(\sin x^2 + \tan^2 x)$$

7.

$$g(x) = \sec(x^2 + 3x - 2)$$

8.

$$h(t) = \left(t + t^{\frac{5}{2}}\right)^{\frac{1}{3}}$$

9.

$$g(y) = \frac{y + y^{-1}}{y - y^{-1}}$$

10.

$$f(x) = (4x^3 - 9x^2)^2(3x - 2x^2)^3$$

Solutions:

1.

$$f'(x) = \frac{4}{3}\left[\sin(4x^3-8)-5x\right]^{\frac{1}{3}}\left(12x^2\cos(4x^3-8)-5\right)$$

2.

$$g'(x) = \frac{(2x^2-8)(\tan x + x\sec^2 x) - 4x^2\tan x}{(2x^2-8)^2}$$

3.

$$f'(x) = \cos(2x^3)\left(2\sin(\frac{x}{4})\cdot\frac{1}{4}\cos(\frac{x}{4})\right) - \sin^2(\frac{x}{4})\cdot(6x^2)\sin(2x^3)$$

4.

$$h'(t) = \frac{(2t^3+t)^{\frac{3}{2}}(-3\sin 3t) - \cos 3t\cdot(\frac{3}{2})(2t^3+t)^{\frac{1}{2}}(6t^2+1)}{(2t^3+t)^3}$$

5.

$$g'(x) = -2 - \frac{1}{2}x^{-\frac{3}{2}}$$

6.

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

7.

$$g'(x) = \tan(x^2+3x-2)\sec(x^2+3x-2)\cdot(2x+3)$$

8.

$$h'(t) = \frac{1}{3}(t+t^{\frac{5}{2}})^{-\frac{2}{3}}(1+\frac{5}{2}t^{\frac{3}{2}})$$

9.

$$g'(y) = \frac{(y-y^{-1})(1-y^{-2}) - (y+y^{-1})(1+y^{-2})}{(y-y^{-1})^2}$$

10.

$$f'(x) = (4x^3-9x^2)^2\left[3(3x-2x^2)^2(3-4x)\right] + (3x-2x^2)^3\left[2(4x^3-9x^2)(12x^2-18x\right]$$