SCORE_____

1. Find functions f and g such that the given function is $f(g(x))$ and find the derivative.

$$(2x^2 - 7x + 6)^9$$

[7 points]

2. Find the derivative of the function $f(x) = \sin 2x(3x + 7)^5$.

[7 points]

3. Find $f'(5)$, if $f(x) = x^2 e^{0.2x}$

[8 points]

4. Find an equation of the tangent line to the curve at the point (0,0).

$$y = \sin x + \sin^2 x$$

[8 points]

5. Find $f''(x)$, given the following

$$f(x) = x \cos x$$

[8 points]

6. Suppose that $f(2) = -3, g(2) = 2, f'(2) = -2,$ and $g'(2) = 1$. Find $h'(2)$

$$h(x) = [f(x)g(x)]^2$$

[8 points]

7. Two ships leave the same port at noon. Ship A sails north at 5 mph, and ship B sails east at 12 mph. How fast is the distance between them changing at 1 p.m.?

[8 points]

8. Find y' using implicit differentiation

$$2y^2 - 3xy - x = 6$$

[8 points]

9. Find $\dfrac{dy}{dx}$, given $y = (\sin x)^{\cos x}$ (Hint: Use logarithmic differentiation).

[8 points]

10. Use differentials (or equivalently, a linear approximation) to approximate $\sqrt[3]{7.8}$.

[8 points]

Bonus. Use implicit differentiation to find the following derivative:

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

[6 points]