MATH 1551 Sample Midterm Exam 2

Directions: In the exam, you must work on you own without reference to notes or text and whow all work to receive credit.
Not allowed in the exam: formula sheet, notes, book, calculator or any electronic device.
Only allowed: pen/pencil.

Name: _____

Question	Points	Score
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
Total:	60	

1. (10 points) Is the function $f(x) = |x + 2|$ differentiable at $x = -2$? Justify your answer.

2. (10 points) Suppose that the differentiable function $y = f(x)$ has an inverse, and that the graph has a normal line at (-1,2) with equation

$$y - 2 = 6(x + 1).$$

Find the value of $(f^{-1})'$ at $y = 2$. Show your work, in particular, if you are using a formula, make sure to state it.

3. (10 points) Calculate the following derivatives. You don't have to simplify.

(a) $y = (x^2 \ln(\cot x))^3$

(b) $y = \frac{\sqrt{6-4x^2}}{3x-7x^4}$

(c) $y = \tan(e^{-2x})\cos(1+\frac{1}{x})$

4. (10 points) Calculate the derivative y' for the implicit function of x given by the equation

$$3x^2y + 3\cos y = 2x.$$

Use your result to obtain the tangent and normal lines to curve at the point $(3/2, 0)$.

5. (10 points) Use the definition of derivative and the identity $\cos(a+b) = \cos a \cos b - \sin a \sin b$ to show that

$$\frac{d}{dx} \cos x = -\sin x.$$

6. (10 points) Use the derivative of an inverse function $[f^{-1}(x)]' = \frac{1}{f'(f^{-1}(x))}$ to deduce the formula:

$$\frac{d}{dx} \cos^{-1} x = -\frac{1}{\sqrt{1-x^2}}.$$