EXAM 3 - MATH 151

DATE: Friday, November 2

INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 5 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Compute the following derivatives:
   (a) $g(x) = x \sin \sqrt{1+x^2}$ (2 points)
   (b) $h(x) = \cos(\cos(\cos x))$ (3 point)
2. (a) Find $\frac{dy}{dx}$ if $\cos(xy^2) = y$. (2 points)
   (b) Find an equation for the tangent line to the graph of $2(x^2+y^2)^2 = 25(x^2-y^2)$ at the point $(3,1)$. (3 points)
3. An aircraft is climbing at a 30° angle to the horizontal. How fast is the aircraft gaining altitude if its speed is 500 mi/hr? (5 points)
   (a) Write an equation expressing the altitude h in terms of the distance x of the plane from the point of departure. (2 points)
   (b) Take derivatives of both sides and then solve for $\frac{dh}{dt}$. (2 points)
   (c) Answer the question posed by the problem. (1 point)
4. (a) Let $f(x) = \frac{1}{x-1}$. Find a formula for $f^{-1}(x)$. (2 points)
   (b) Find $(f^{-1})'(2)$, if $f(x) = x^3 + 2e^x$. (3 points)
5. (a) Compute $f'(x)$ if $f(x) = e^{x \sin 2x}$. (2 points)
   (b) Find an equation of the tangent line to the graph of $xe^y + ye^x = 1$ at the point $(0,1)$. (3 points)
6. Find $\frac{dy}{dx}$ if
   (a) $y = (\sin x)^{\ln x}$. (2 points)
   (b) $x^y = y^x$. (3 points)