PRACTICE EXAM 2 - MATH 151

DUE DATE: Friday, January 30
INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 3 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Find the limits
   (a) $\lim_{x\to 0} \frac{2\sin^3 x}{7x^3}$
   (b) $\lim_{x\to 0} \frac{1-\cos 7x}{\cos 3x-1}$
   (c) $\lim_{x\to 0} \frac{\sin x}{1+\cos x}$
   (d) $\lim_{x\to 0} \frac{x}{1-\cos^3 x}$
2. Find a value for the constant k that makes $f(x) = \begin{cases} \frac{\sin kx}{5x}, & \text{if } x < 0 \\ 2x - k, & \text{if } x \geq 0 \end{cases}$ continuous at $x = 0$.
3. Use the definition of the derivative to find $f'(x)$ and then to find the equation of the tangent line to $f(x) = \sqrt{3x+2}$ at $x = \frac{7}{3}$.
4. Find $\frac{dy}{dx}$
   (a) $f(x) = (x^3 - 3x^2 + 1)(x^{17} - 3x^{15} + 7x^5)$
   (b) $f(x) = \frac{\cos x}{\tan x-1}$
   (c) $f(x) = (\sin(3x^5) + 3x^2)^7$
   (d) $f(x) = \sin(\cos(\frac{x^2-1}{x+5}))$
5. Find $\frac{dy}{dx}$ by implicit differentiation
   (a) $\tan(x^2y^2) = x^2 + y^2$
   (b) $x^5 = \frac{2x+1}{x+y}$
6. Find the equation for the tangent line to the graph of $y^2 - x + 1 = 0$ at the point $(10, -3)$.