Assignment 3 MATH 1500

(Follows Unit 9 in the manual)

Values

[16] 1. Use the differentiation rules (not the definition of the derivative) to calculate the derivatives of the following functions. Do not simplify.

(a) $f(x) = \left(5x^3 + 3x^2\right)^{1/4}$ (b) $f(x) = \left(e^{-2x} + 4\cos 3x\right)^3$

(c) $f(x) = \sqrt{\tan^2 x - \sqrt{4x}}$ (d) $f(x) = \left(\tan x \sin x\right)\left(e^{3x^2} + x^{3/2}\right)^3$

[10] 2. Use implicit differentiation to find $\frac{dy}{dx}$ in terms of x and y

(a) $x^2y^2 + 2xy = 3x$ (b) $2y^3 + x\sin y + 2x^2y = y$

[6] 3. Find an equation of the tangent line to the curve $2x^3 - 3y^3 + x^2y = 4$ at the point (1, –1).

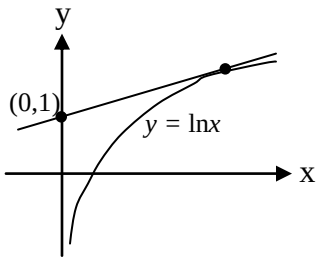
[10] 4. Find the third order derivative $f'''(x)$ of $f(x) = 2x^4 + 3x\cos^2 x$.

[12] 5. Differentiate the following functions. (Do not simplify)

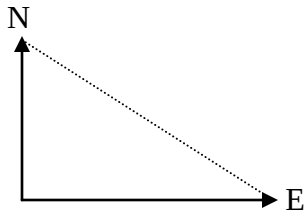
(a) $f(x) = \ln(\tan x - \sin 2x)$ (b) $f(x) = (2x^2 - 3)\ln(x^2 + 5x)$

(c) $f(x) = x^{\tan x}$

[8] 7. The curve $y = \ln x$ has one tangent line that passes through the point (0, 1). Find the equation of this tangent line.



[8] 8. Two people start from the same point. One walks east at 4 km/hr while the other walks north at 3 km/hr. How fast is the distance between the people changing after 1/2 hour?



Total = 70