Assignment 3 MATH 1500

(Follows Unit 9 in the manual)

Values

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

(a) $f(x)=\sqrt{3x^4+5x^2}$ (b) $f(x)=\left(e^{x^2}+\sin 3x\right)^5$ (c) $f(x)=\sqrt{x+\sqrt{x}}$

[4] 2. Given that $f(x)$ is a differentiable function and $f'(4)=3$, find the value of $\frac{d}{dx}f(\sqrt{x})$ when $x=4$.

[5] 3. Use implicit differentiation to find $\frac{dy}{dx}$ in terms of x and y if $x^3y-y^3x=x$.

[6] 4. Find an equation of the tangent line to the ellipse $x^2+2y^2=9$ at the point (1, 2).

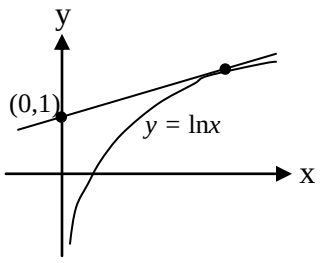
[7] 5. Find the third order derivative $f'''(x)$ of $f(x)=4x^4-2x\sin x$.

[12] 6. Differentiate the following functions. Do not simplify.

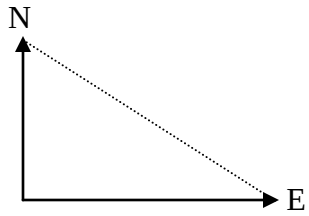
(a) $f(x)=\ln(\tan 3x+\cos 5x)^2$ (b) $f(x)=(e^{x^3}+2\ln x)\left(\cos\left(\frac{1}{x^2}\right)\right)$

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

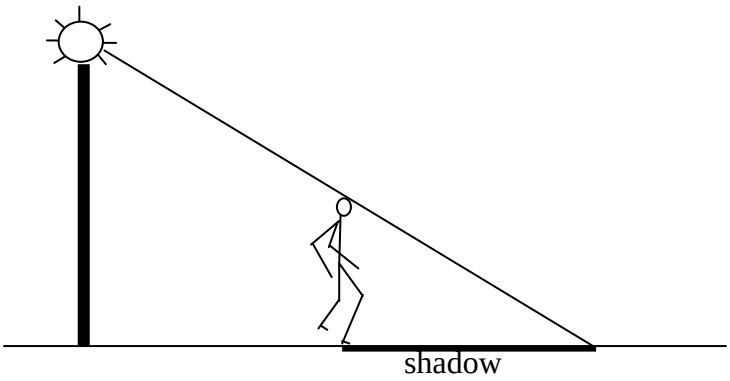
[9] 7. The curve $y=\ln x^3$ has one tangent line that passes through the point (0, 1). Find the equation of this tangent line.



[9] 8. Two people start from the same point. One walks east at 8 km/hr while the other walks north at 6 km/hr. How fast is the distance between the people changing after 1/2 hour?



[9] A man is 1.8 meters tall and is walking away, at night, from a pole that is 9 meters high. At the top of the pole is a light that casts a shadow of the man on the sidewalk. If the man is walking at 1.6 meters per second, how fast is the length of the shadow changing at the instant when the man is 12 meters from the pole?



Total = 70