MATH 1000, Slot F05 Worksheet 6

Due: Oct. 27/2009 (Tuesday) by 5pm

---

1. Find the derivative of each function, simplifying where appropriate.

   (a) $y = \ln(1-x^2)^4$ (b) $y = e^{\tan^2(1/x)}$

   (c) $y = y = \sin^4\left(\frac{-3x}{4}\right)$ (d) $y = \cot^3(\sqrt{9-x^2})$

2. If $y = \sin^2(ax) - \cos^2(ax)$ show that $y' = 2a\sin(2ax)$. (a is a constant.)

3. Given that $f(2) = -3$, $g(2) = 3$, $f'(2) = -1$, $g'(2) = -4$, $f''(2) = 2$ and $g''(2) = 2$, find $y''(2)$ where f and g are differentiable and $y = f(x)g(x)$.

4. Find the indicated derivative of each function, simplifying where appropriate. The letter a represents an unspecified constant.

   (a) $y = 2x^3 - \sqrt{5}x^2 + \sqrt{2}x - 1$, y'' (b) $y = \tan(2x)$, y''

   (c) $f(x) = \ln(1+ax)$, $f'''(x)$ (d) $y = x^2e^{x^2}$, y''

5. Find the **second** derivative, y'', of each function, simplifying where appropriate.

   (a) $y = (1-x^2)^4$ (b) $y = \left(x + \frac{1}{x}\right)^5$

   (c) $y = \frac{x}{(1-x)^2}$ (d) $y = \ln x + \cos(1-x^3)$

6. Find $\frac{dy}{dx}$ by implicit differentiation:

   (a) $y^5 + 3x^2y^2 + 5x^4 = 12$

   (b) $\sin(x-y) = x\sin y$

7. Find equations of the tangent and normal lines to the curve $(x+y)^3 = x^3y + 1$ at the point $(1, -2)$.

8. If $xe^y = y^2 - 1$, find the slope of the tangent to the curve at the point $(0, 1)$.