Double Trouble [a pair activity]

All of the following problems require you to use ***at least two different differentiation rules***. Like the Weasley twins, they might be trouble! Show ALL steps and use standard mathematical notation. Clearly indicate your choices for u, $\frac{du}{dx}$ and if necessary, v, $\frac{dv}{dx}$ or if applicable.

Find the derivative of the following functions:

1. $f(x)=\sqrt[3]{x^3-3}\,(\tan(3x))$

2. $g(x)=\dfrac{\cos(5x)}{(x+5)}$

3. $h(x) = x^2[f(g(x))]$

4. $f(x) = g^2(x)\left[\sqrt{2x+6}\right]$

5. $h(x) = \tan(5x)\sec(5x)$

6. $f(x) = \sin^2 x + \cos^2 x$

7. $g(x)=\dfrac{f(5x)}{x^2+5}$

8. $h(x)=(x-1)\left(x^2+3\right)^5$

9. $f(x)=\sin x\cos^2 x$

10. $h(x) = f(g(5x))$

11. Find $\frac{dy}{dx}$ in terms of x and y for: $\sin(5xy) = x^2 + y$

12. Find $\frac{d^2y}{dx^2}$ in terms of x and y for: $2x^3 - 3y^2 = 8$