CfE AH Maths Homework 3.

1. Given $f(x) = 6x^4 e^{\cot 2x}$ where $0 < x < \frac{\pi}{4}$

   find $f'(x)$

2. Express in partial fractions $\dfrac{8x^3+x^2-39x+12}{x(x^3-2x^2-5x+6)}$

3. Use the substitution $u = x+4$ to evaluate $\displaystyle\int_0^5 \frac{x}{\sqrt{(x+4)}}\,dx$

4. Differentiate with respect to x

   $$y = \sin\left(\frac{1+x^2}{1-x}\right)$$

5. Find the following indefinite integrals using a substitution

   (a) $\displaystyle\int (x^2+2)\left(\tfrac{1}{3}x^3+2x\right)dx$ (b) $\displaystyle\int \left(-2\sin 2x\, e^{\cos 2x}\right)dx$

6. Evaluate. (a) $\displaystyle\int \frac{dx}{9x^2+4}$ (b) $\displaystyle\int \frac{dx}{\sqrt{25-9x^2}}$