# MATH181 Homework Sheet 3
## *(Due 24 October 2011)*

Hand in solutions to all problems by 5.00 pm on Monday October 24.
For help, see Stroud, section F11, and sections 7 and 8.

1. Differentiate with respect to $x$

$$(i) \ x^5 + x^{-5} + x \ \ln(x), \qquad (ii) \ x^3 \sin \ x \ , \qquad (iii) \ \frac{\ln(x) + 3}{x + 2} \ .$$

2. Differentiate with respect to $x$

$$(i) \ \cos(x^2), \qquad (ii) \ x^2 \ e^{\cos x} \ , \qquad (iii) \ \sqrt{1 + \sin 3x}$$

3. Find the equation of the tangent to the graph of the function

$$y = \frac{2x}{x^3 + 1}$$

at the point $(x = 2)$.

4. Find the derivative of
$$x^3 e^{3x} \sin 2x.$$

5. Calculate the derivative of
$$f(x) = \frac{2}{x + 3}$$

*from first principles.*