

## MAS051 — Example Sheet 9

To be handed in: Friday, November 22, 2002

Remember to give your Tutorial Group, along with your name, on the assignment. Only the *asterisked* (starred) questions will be marked.

1. Differentiate the following polynomials with respect to  $x$ :

- (a)  $x^5$ ; (b)\*  $x^9$ ; (c)  $x^{30}$ ;  
(d)\*  $x^{75}$ ; (e)  $2x + 7$ ; (f)\*  $x^3 - 2x^2 + 6$ ;  
(g)  $3x^{10} - 6x^5 + x$ ; (h)\*  $x^4 - 2a^2x^2 + a^4$ ; (i)  $ax^3 + bx^2 + cx + d$ .

2. Differentiate the following powers of  $x$  with respect to  $x$ :

- (a)  $x^{\frac{1}{5}}$ ; (b)\*  $x^{\frac{1}{10}}$ ; (c)  $x^{\frac{7}{4}}$ ; (d)\*  $x^{\frac{4}{7}}$ ; (e)  $\frac{1}{x^3}$ ;  
(f)\*  $\frac{1}{x^7}$ ; (g)  $\frac{1}{x^{50}}$ ; (h)  $\frac{1}{x^n}$ ; (i)\*  $\frac{1}{x^{\frac{1}{5}}}$  (j)  $\frac{1}{x^{\frac{1}{2}}}$ .

3. Differentiate the following powers of  $x$  with respect to  $x$ :

- (a)  $x^8$ ; (b)\*  $x^{83}$ ; (c)  $x^{1000}$ ; (d)\*  $x^{\frac{3}{4}}$ ; (e)  $x^{3.8}$ ;  
(f)\*  $x^{-11}$ ; (g)  $1/x^9$ ; (h)\*  $x^{\frac{4}{3}}$ ; (i)  $1/x^{\frac{4}{3}}$ ; (j)  $x^{-6.8}$ .

4. Differentiate the following polynomials with respect to  $x$ :

- (a)  $x^2 - 5x + 7$ ; (b)\*  $3x^2 + 11$ ; (c)  $x^3 + 2x^2 + 9x$ ;  
(d)  $2x^3 - 3x^2 + 9$ ; (e)\*  $7x^4 - 8x^3 + 5x^2 + 5x + 5$ ; (f)  $x^4 + x^3 + x^2 + x + 1$ .

5. In each of the following cases, find the equation of the tangent line to the given curve at the point on the curve where  $x = 2$ :

- (a)\*  $y = x^3 + 3x^2 + 1$ ; (b)  $y = x^5$  (c)  $y = 4x^2 + 5x + 6$  (d)\*  $y = x^{-3}$ .

6. Use the product rule to differentiate each of the following functions:

- (a) \*  $(x^2 + 4x + 5)(x^3 - 2x^2 + 7)$ ;  
(b)  $(x^3 - x^2 - 2)(x^2 - x - 1)$ ;  
(c) \*  $(5x^3 + 6)(x^2 - 8x + 4)$ .  
(d)  $(4x^4 + 2x)(x + 2x^5 + x^{-2})$ .

AJD September 26, 2002