MATH141 – Autumn 2007
Tutorial Sheet – Week 2

Solutions may be available as of Friday at the MATH141 web site:
`http://www.uow.edu.au/~mnelson/teaching.dir/math141.html`

(The university is updating it's web pages and solutions may not be made available at this site. Instead, please check the e-learning site).

1. Evaluate each of the following summations, then state which one is equal to 7.

   (a) $\sum_{\alpha=1}^{2} (2\alpha + 1)$ (b) $\sum_{\alpha=1}^{2} 2\alpha + 1$ (c) $\sum_{i=1}^{2} 2\alpha + 1$

2. Evaluate each of the following summations

   (a) $\sum_{k=1}^{4} k \sin \frac{k\pi}{2}$ (b) $\sum_{k=0}^{4} 1$ (c) $\sum_{k=1}^{20} \left(\frac{1}{k} - \frac{1}{k+1} \right)$

3. Given that $\sum_{k=1}^{n} k = \frac{n(n+1)}{2}$ and $\sum_{k=1}^{n} k^3 = \left(\frac{n(n+1)}{2} \right)^2$, evaluate $\sum_{k=1}^{6} \left(4k^3 - 2k + 1 \right)$.

4. Evaluate $\sum_{k=1}^{10} (k+2)^3$, given

$$\sum_{k=1}^{n} k^3 = \frac{n^2 (n+1)^2}{4},$$
$$\sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6},$$
$$\sum_{k=1}^{n} k = \frac{n(n+1)}{2}.$$

5. Evaluate the following.

   (a) $\sum_{i=1}^{4} \sum_{j=1}^{4} \delta_{ij} \delta_{j3} x_i x_3$, (b) $\sum_{k=1}^{4} \sum_{m=1}^{2} \delta_{km} \delta_{k3}$.

6. Evaluate the following

   (a) $\sum_{j=1}^{4} \sum_{i=1}^{4} \delta_{i3} \delta_{ij}$, (b) $\sum_{j=1}^{3} \sum_{i=1}^{3} (3i + j) \delta_{ij}$

7. Simplify each of the following

   (a) $2^{5x} \times 8^x \div 4^{2x}$ (b) $\left(x^2 - y^2\right)^{1/2} \times (x-y)^{3/2} \times (x+y)^{-1/2}$
   (c) $7 \log 5 - \log 25$ (d) $\frac{\log 64}{\log 16}$
   (e) $2\sqrt{10} \times 4\sqrt{15}$ (f) $3\sqrt{32} + 2\sqrt{50} - 8\sqrt{18}$

8. Without using your calculator, solve for x if

   (a) $\log_5 25\sqrt{5} = x$; (b) $3 \log_5 x + 4 = \log_5 x^7$.

9. Factorise the following

   (a) $3x^2 + 4x - 7$ (b) $a^2 - b^2 + 2a - 2b$

10. Solve the following equation by factorisation

$$5x^2 - 26x + 24 = 0.$$

11. Solve the following equation using the quadratic formula

$$4x^2 + 11x + 2 = 0.$$

12. Solve $9^x - 10\,(3^x) + 9 = 0$.

13. Simplify the following

(a) $\dfrac{3x^3}{4a^2} \times \dfrac{ay - a}{xy^2} \div \dfrac{3y - 3}{4ay^2}$

(b) $\dfrac{5x}{3} - \dfrac{2x + 3}{4} + \dfrac{x}{6}$

Week 2 Lecture Material

FUNDAMENTALS
(Mark Nelson)
Sections 1.3–1.8.
Exercises 1.3.2, 1.4.1, 1.5.2, 1.7.2, 1.8.3 & 1.8.5

ALGEBRA
(Tim Marchant)
For Wednesday, read Sections 5.1 to 5.5 inclusive
Exercises 5A