

## Vector Calculus

Homework Set 4

Due Wednesday, 9 February 2005

Course Web Site: <http://www.math.sfu.ca/~ralfw/math252/>Textbook: Davis and Snider "*Introduction to Vector Analysis*":

Reading: Sections 2.3–2.4, 3.1

**Problems to study (for practice; you do not need to hand these in):**

- Section 2.4 (pp.102–103): 1, 4, 6, 10, 16
- Section 3.1 (pp.112–114): 1, 8, 10(d), 11, 14, 19, 20, 21, 24, 29, 36

**Problems to hand in:**

- Section 2.3 (pp.95–98): 18
- Section 2.4 (pp.102–103): 3, 7, 8, 14
- Section 3.1 (pp.112–114): 4, 5, 7, 10(a), 12, 17, 23, 32, 34

*Extra problem (to hand in)*

1. Let  $r = |\mathbf{R}| = |\mathbf{x}| = (x^2 + y^2 + z^2)^{1/2}$  be the distance of the point  $(x, y, z)$  from the origin in  $\mathbb{R}^3$ . Using Cartesian coordinates, compute

(a)  $\mathbf{grad} r$

(b)  $\mathbf{grad} \frac{1}{r}$

Write your answers in terms of  $r$  and  $\mathbf{R}$ . We will see later that these calculations are much simpler in spherical polar coordinates.