

# Research Awards Screening Test, 2005

## KEY

### Section 1: Algebra

- 1.1 5
- 1.2 5
- 1.3  $\alpha = -1/2, \beta = 1, \gamma = 1/2$
- 1.4 2
- 1.5 4
- 1.6 12
- 1.7 (a), (b)
- 1.8 (a) (c)
- 1.9 (a) (c) (d)
- 1.10 (a) (c) (d)

### Section 2: Analysis

- 2.1  $\int_0^1 f(t)dt$
- 2.2  $\infty$
- 2.3  $]1, \infty[$
- 2.4 1
- 2.5 0
- 2.6 0
- 2.7 (b) (c)
- 2.8 (b) (c)
- 2.9 None
- 2.10 (b)

### Section 3: Topology

- 3.1 uniformly continuous
- 3.2 0
- 3.3 1
- 3.4 infinite
- 3.5 open, dense
- 3.6 compact, connected

- 3.7 open
- 3.8 closed, connected
- 3.9 nowhere dense
- 3.10 closed, compact, connected

### Section 4: Applied Mathematics

- 4.1  $4\pi$
- 4.2 0
- 4.3  $\pi^2$
- 4.4 0
- 4.5 3
- 4.6 17
- 4.7 elliptic
- 4.8  $\pi$
- 4.9  $\int_{\Omega} f(x, y)dxdy = 0$
- 4.10  $h = 2r$

### Section 5: Miscellaneous

- 5.1 29
- 5.2  $n2^{n-1}$
- 5.3 1
- 5.4  $3\sqrt{3}/4$
- 5.5 2
- 5.6 parallelogram
- 5.7 0
- 5.8  $2/\pi$
- 5.9 True
- 5.10  $2e - 1$

Note: Correct answers to Qns. 2.1, 2.3 and 4.9 in any other equivalent notation can, obviously, be accepted!!!