

Sample Test 1 MATH3132

Time: 75 Minutes

1. Evaluate the line integral

$$\int_C \frac{y}{y+z} ds$$

where  $C$  is the curve  $x = y^2$ ,  $y + z = 4$  from  $(4, 2, 2)$  to  $(0, 0, 4)$ .

**Answer:**  $13\sqrt{2}/12$

2. Evaluate the line integral

$$\int_C (2xye^y + z)dx + (x^2e^y + x^2ye^y - 2y)dy + (x+1)dz$$

where  $C$  is the curve  $y = \sqrt{1-x^2}$ ,  $z = x$  from  $(1, 0, 1)$  to  $(-1, 0, -1)$ .

**Answer:**  $-2$

3. Evaluate the line integral

$$\oint_C (3x^2y^2 - 4x)dx + (2x^3y + x^2)dy$$

where  $C$  is the curve bounding the area enclosed by  $x = 0$ ,  $x = 1 - y^2$ .

**Answer:**  $-16/15$

4. Evaluate the surface integral

$$\iint_S \mathbf{F} \cdot \hat{\mathbf{n}} dS$$

where  $\mathbf{F} = z\hat{\mathbf{k}}$ ,  $S$  is that part of the surface  $z = 4 - x^2 - y^2$  above the  $xy$ -plane, and  $\hat{\mathbf{n}}$  is the unit upper normal to  $S$ .

**Answer:**  $8\pi$

5. Evaluate the line integral

$$\oint_C (x^2 - y) dx + xy dy + 2xz dz$$

where  $C$  is the curve  $x^2 + y^2 = 4$ ,  $x + z = 6$ , traversed once in the counterclockwise direction as viewed from above.

**Answer:**  $4\pi$