Sample Test 1 MATH3132

Time: 60 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: 8π