

Math 2B: Quiz 4B Solutions

Exercise 1(4 points) Evaluate the integral

$$\int \ln(\sqrt{x})dx$$

$$\int \ln(\sqrt{x})dx = x \ln(\sqrt{x}) - \int x \cdot \frac{1}{\sqrt{x}} \cdot \frac{1}{2\sqrt{x}} dx = x \ln(\sqrt{x}) - \int \frac{1}{2} dx = x \ln(\sqrt{x}) - \frac{1}{2}x + C$$

Exercise 2 (3 points) Evaluate the integral

$$\int_0^{\frac{\pi}{2}} 3 \sin^2(z) \cos^3(z) dz$$

Let $u = \sin(z)$, $du = \cos(z)dz$

$$\int_0^{\frac{\pi}{2}} 3 \sin^2(z) \cos^3(z) dz = 3 \int_0^{\frac{\pi}{2}} \sin^2(z)(1 - \sin^2(z)) \cos(z) dz$$

$$3 \int_0^1 u^2(1 - u^2) du = u^3 - \frac{3u^5}{5} \Big|_{u=0}^{u=1} = 1 - \frac{3}{5} = \frac{2}{5}$$

Exercise 3(3 points) Evaluate the integral

$$\int 6 \tan^2(\theta) \sec^4(\theta) d\theta$$

Let $u = \tan(\theta)$, $du = \sec^2(\theta)d\theta$.

$$\int 6 \tan^2(\theta) \sec^4(\theta) d\theta = 6 \int \tan^2(\theta)(1 + \tan^2(\theta)) \sec^2(\theta) d\theta$$

$$6 \int u^2(1 + u^2) du = 2u^3 + \frac{6}{5}u^5 + C = 2 \tan^3(\theta) + \frac{6}{5} \tan^5(\theta) + C$$