

## MOCK QUIZ 1

Note: Most of the problems were taken from the textbook [1].

**Problem 1.** Evaluate the integral

$$\int_0^1 ze^{2z} dz.$$

*Solution:* We integrate by parts. Taking  $u = z$  and  $dv = e^{2z}$ , we find that

$$du = dz \quad \text{and} \quad v = \int e^{2z} dz = \frac{1}{2}e^{2z}.$$

Therefore

$$\int_0^1 ze^{2z} dz = \left. \frac{ze^{2z}}{2} \right|_0^1 - \frac{1}{2} \int_0^1 e^{2z} dz = \frac{e^2}{2} - \left. \frac{e^{2z}}{4} \right|_0^1 = \frac{e^2}{4} + \frac{1}{4}.$$

□

**Problem 2.** Solve the integral

$$\int \sin^3 x \cos^4 x dx.$$

*Solution:* First, notice that

$$\begin{aligned} \int \sin^3 x \cos^4 x dx &= \int (1 - \cos^2 x) \cos^4 x \sin x dx \\ &= \int \cos^6 x (-\sin x) dx - \int \cos^4 x (-\sin x) dx \\ &= \int u^6 du - \int u^4 du \\ &= u^7/7 - u^5/5 + C, \end{aligned}$$

where  $u = \cos x$ . Going back to the initial variable  $x$ , one obtains

$$\int \sin^3 x \cos^4 x dx = \frac{\cos^7 x}{7} - \frac{\cos^5 x}{5} + C.$$

□

## REFERENCES

- [1] J. Stewart: *Single Variable Calculus* 8th Edition, Cengage Learning, Boston 2015.