

國立中山大學 104 學年度碩士暨碩士專班招生考試試題

科目名稱：工程數學【環工所碩士班甲組、乙組】

題號：433001

※本科目依簡章規定「可以」使用計算機（廠牌、功能不拘）（問答申論題）

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1. 試求解 $(2x + y - 7)dx + (x + y - 3)dy = 0$ 之通解 (15%)
2. 已知方程式 $y'' + 4y' + 4 = 0$ ，試求當 $y(0) = 3$ 與 $y'(0) = -1$ 之特解 (15%)
3. 試求函數 $f(x, y, z) = x^2 + 2y + z - 3$ 在平面 $x + y - z - 1 = 0$ ， $0 \leq x \leq 1$ ， $0 \leq y \leq 1$ 之面積分 (20%)
4. The Euler formula is given by $e^{iy} = \cos y + i \sin y$, where $i = \sqrt{-1}$.
Find the value of e^{iy} when $y = -\pi/4$. (15%)
5. The Newton's iteration method for a continuous and differentiable function $f(x)$ is given by
 - (a) Find x_3 for $f(x) = x^2 - 1$, with starting value $x_0 = 0.5$. (15%)
 - (b) Is the above value a good approximation to the positive solution of $x^2 - 1 = 0$ (5%)
6. A 95% confidence interval for a random variable x with a normal distribution is given by

$$CONF\{(\mu - 1.96\sigma/\sqrt{n} < x \leq \mu + 1.96\sigma/\sqrt{n})\}$$

where n is the sample size, μ is the sample mean, and σ is the standard deviation.

Use the above formula to determine the 95% confidence interval for $n=100$, $\mu=6$, and $\sigma=2$. (15%)