國立臺北科技大學

九十五學年度學士班二、三年級轉學生招生考試

四技二年級 專業科目（一） 微積分試題

填准考證號碼

注意事項：

1. 本試題共十題，每題十分，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. Suppose that $(\bar{x}, \bar{y})$ is the centroid of the region bounded by the graph of the parametric equations $x = t - \sin t,\ y = 1 - \cos t,\ 0 \le t \le \pi$ and the x-axis. Find $\bar{y} = ?$

2. Suppose x and y are two positive real numbers. Use the Lagrange multipliers to find the minimum of $f(x,y) = x\sqrt{x^2 + y^2}$ subject to the constraint $x^2 y = 1000\sqrt{2}$.

3. Evaluate $\int_0^2 \int_0^{2-z} \int_0^{\sqrt{4-z^2}} \sqrt{x^2 + z^2}\, dx\, dy\, dz$.(Hint: Change the coordinates system from (x, y, z) to (r, y, θ)).

4. Let $\Omega = \{(x,y) \mid 0 \le y \le \frac{1}{1+x^2},\ 0 \le x \le 1\}$. Find the volume of the solid obtained by rotating Ω about the $x-$axis.

5. Find the symmetric equation for the line of intersection of the planes $2x + y - 3z = 2$ and $x + 2y - z = 3$.

6. Evaluate $\int_0^1 \int_0^{\cos^{-1} y} \sin x \sqrt{1 + \sin^2 x}\, dx\, dy$.

7. Evaluate $\int_0^\infty x e^{-2x}\, dx$.

8. Evaluate the sum of $\sum_{n=1}^{\infty} n(\frac{3}{4})^{n-1}$.

9. Find the limit of $\lim_{x \to 0}(\frac{1}{x^2} - \cot^2 x)$.

10. Find equations of both lines through the point $(2, 0)$ that are tangent to the ellipse $\frac{x^2}{3} + y^2 = 1$.