國立臺灣大學109學年度轉學生招生考試試題

題號： 25
科目：微積分(C)

＊注意：請於試卷上「非選擇題作答區」標明題號並依序作答。

不得使用計算機，每題 10 分，總分 100 分。

1. $\lim_{x\to\infty} \frac{\sqrt[x]{2}-1}{\frac{1}{x}}=?$

2. Find $f'(2)$ if $f(x)=e^{g(x)}$ and $g(x)=\int_4^{x^2}\frac{t}{1+t^3}dt$.

3. Trochoid $x=2\theta-\sin\theta$, $y=2-\cos\theta$. Find the tangent line of the curve at $\theta=\frac{\pi}{2}$.

4. Trochoid $x=2\theta-\sin\theta$, $y=2-\cos\theta$. Find the area under the curve and above the x-axis for $0\le\theta\le 2\pi$.

5. Let the region R be enclosed by the curves $y=x^2$ and $y=2-x^2$. Find the volume of the solid obtained by rotating the region R about $x=1$.

6. Let the region R be enclosed by the curves $y=x^2$ and $y=2-x^2$. Find the arc length of the region R.

7. Evaluate $\iint_R \cos(\frac{y-x}{y+x})dA$ where R is the trapezoidal region with vertices $(1,0)$, $(2,0)$, $(0,2)$ and $(0,1)$.

8. Let $f(x,y)=x^4+y^4-4xy+1$. Find local maxima, local minima, and saddle points of $f(x,y)$.

9. Find the absolute maximum value and absolute minimum value of $f(x,y)=x^4+y^4-4xy+1$ on the disk $x^2+y^2\le 1$.

10. Solve the differential equation $xy'=y+x^2\sin x$ with $y(\pi)=2\pi$.

試題隨卷繳回