國　立　宜　蘭　大　學
101 學年度轉學招生考試

（考生填寫）
准考證號碼：

微　積　分　試　題

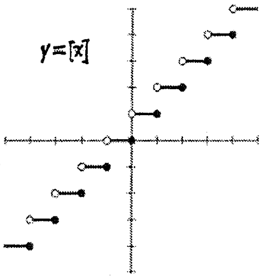
《作答注意事項》

1. 請先檢查准考證號碼、座位號碼及答案卷號碼是否相符。
2. 考試時間：80 分鐘。
3. 本試卷共有單選題 20 題，一題 5 分，答錯不倒扣，共計 100 分。
4. 請將答案寫在答案卷上（於本試題上作答者，不予計分）。
5. 考試中禁止使用大哥大或其他通信設備。
6. 考試後，請將試題卷及答案卷一併繳交。
7. 本試卷採雙面影印，請勿漏答。
8. 本試題附計算紙一張。

1. $\lim_{x\to 1}\dfrac{|x^2-1|}{x-1}$ =(A)1 (B)2 (C)0(D) It does not exist.

2. Let $[x]$ be the greatest integer $\le x$. Find $\lim_{x\to 0} x\cdot\left[\dfrac{1}{x}\right]$ = (A)1 (B) -1 (C) 0

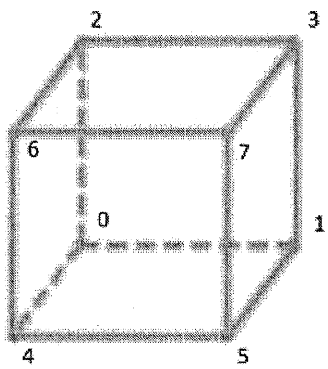
(D) It does not exist.



3. Find $\int_2^4 [x]\,dx$ = (A)4 (B)5 (C)6(D) It does not exist.

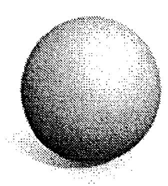
4. $\int_0^{\frac{\pi}{2}} (\cos x+\cos 2x+\cos 4x)dx$ = (A)1 (B) 0 (C)$1+\dfrac{1}{2}+\dfrac{1}{4}$(D) $1+2+4$

5. The diagram below is a cube of side 1. Find the volume of the solid common to two triangular pyramids 0456 and 4517. (A) $\dfrac{1}{18}$ (B) $\dfrac{1}{24}$ (C) $\dfrac{1}{12}$ (D)$\dfrac{1}{16}$.



6. The volume of the unit solid sphere is (A) $\int_{-1}^{1} \pi x^2 dx$ (B) $\int_0^1 2\pi x\sqrt{1-x^2}\,dx$

(C) $2\int_0^1 \pi(1-x^2)dx$ (D) $\int_{-1}^{1} 2\pi x\sqrt{1-x^2}\,dx$.



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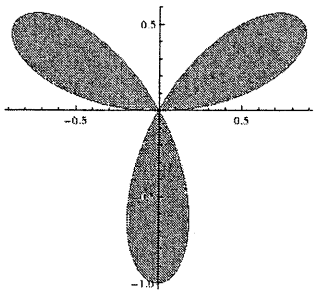
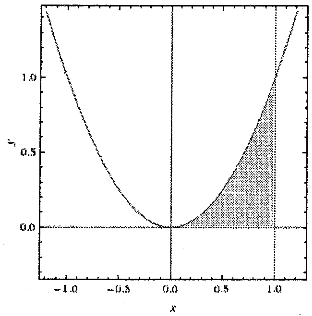
7. Find the area of the shaded region ($r=\sin 3\theta$). (A) $3\int_0^{\frac{\pi}{2}}\int_0^{\sin 3\theta} r\,dr\,d\theta$

(B) $3\int_0^{\frac{\pi}{3}}\int_0^{\sin 3\theta} r\,dr\,d\theta$ (C) $3\int_0^{\frac{\pi}{2}}\int_0^{\sin 3\theta} dr\,d\theta$ (D) $3\int_0^{\frac{\pi}{3}}\int_0^{\sin 3\theta} \sin 3\theta\,dr\,d\theta$

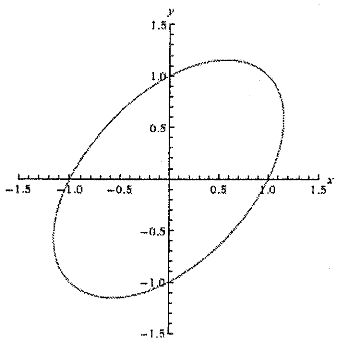


8. Find the centroid of the plane region $Q=\{(x,y)\mid 0\le x\le 1,\ 0\le y\le x^2\}$.

Answer: $(\bar{x},\bar{y})=\left(\dfrac{\iint_Q x\,dA}{\frac{1}{3}},\dfrac{\iint_Q y\,dA}{\frac{1}{3}}\right)=(A)\left(\frac{1}{2},\frac{1}{8}\right)$(B) $\left(\frac{3}{5},\frac{3}{8}\right)(C)\left(\frac{3}{4},\frac{3}{10}\right)(D)\left(\frac{2}{3},\frac{1}{3}\right)$



9. If $x^2+y^2-xy=1$, find $\left.\dfrac{dy}{dx}\right|_{\substack{x=1\\y=0}}$. (A)1 (B)2 (C)1.5 (D)3



10. If $f(x)$ is a continuous function defined on $[a,b]$, $P=\{a=x_0<x_1<x_2<\cdots<x_n=b\}$ is a partition of $[a,b]$, $\Delta x_i=x_i-x_{i-1}$, and $x_{i-1}\le x_i^*\le x_i$, $x_{i-1}\le x_i^\bullet\le x_i$,

then $\lim_{\max\{\Delta x_1,\Delta x_2,\cdots,\Delta x_n\}\to 0}\sum_{i=1}^{n} f(x_i^*)\sqrt{1+(x_i^\bullet)^2}\,\Delta x_i=$ (A) $\dfrac{d^2}{dx^2}\left(f(x)\sqrt{1+x^2}\right)$

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(B) $\frac{d}{dx}(f(x)\sqrt{1+x^2})$ (C) $\int_a^b(\int_a^b f(x)\sqrt{1+x^2})dy)dx$ (D) $\int_a^b f(x)\sqrt{1+x^2}dx$.

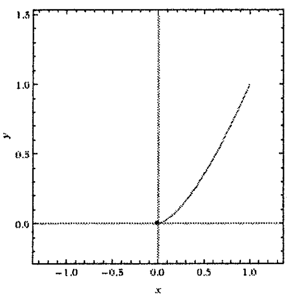
11. If $F(x,y)=f(y+2x)+g(y-2x)$ then (A) $\frac{\partial^2}{\partial x^2}F(x,y)=2\cdot\frac{\partial^2}{\partial y^2}F(x,y)$
(B) $\frac{\partial^2}{\partial x^2}F(x,y)=4\cdot\frac{\partial^2}{\partial y^2}F(x,y)$ (C) $\frac{\partial^2}{\partial x^2}F(x,y)=\frac{\partial^2}{\partial y^2}F(x,y)$ (D) $\frac{\partial^2}{\partial x^2}F(x,y)=-\frac{\partial^2}{\partial y^2}F(x,y)$.

12. If $F(x,y,z)=c$ then $(\frac{\partial z}{\partial y})_x\cdot(\frac{\partial y}{\partial x})_z\cdot(\frac{\partial x}{\partial z})_y$ =(A)1 (B) -1 (C) 0 (D) 2.

13. If $f(x)=a_4x^4+a_3x^3+a_2x^2+a_1x+a_0$, $\lim_{x\to\infty}\frac{f(x)}{x^4}=-1$, $\lim_{x\to 0}\frac{f(x)}{x}=1$, and $f''(0)=0$,
then $\int_{-1}^{1}f(x)dx$ =(A) 0.2 (B) -0.2 (C) 0.4 (D) -0.4.

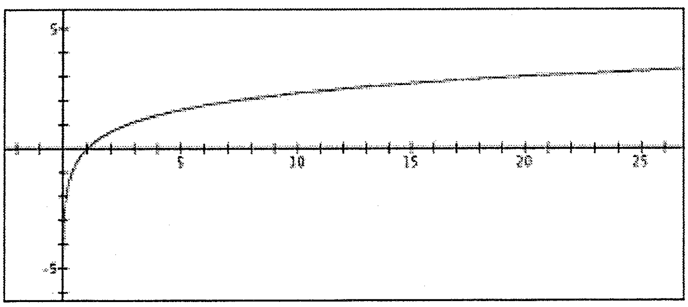
14. Let $f(x)=\begin{cases}1, \text{if } x \text{ is rational.}\\ -1, \text{if } x \text{ is irrational.}\end{cases}$ It follows that (A) the function $f(x)$ is continuous at $x=0$. (B) the function $f(x)$ is continuous at $x=1$. (C) the function $f(x)$ is continuous at $x=-1$. (D) the function $f(x)$ is continuous nowhere.

15. Find the arc length of the function $y=f(x)=x^{\frac{3}{2}}$, x from 0 to 1. (A) $\sqrt{2}$ (B) $\frac{3}{2}$
(C) $\frac{\pi}{2}$ (D) $\frac{8}{27}(\frac{13}{4})^{1.5}-\frac{8}{27}$



16. Find the interval of convergence of the power series $1+x+2!x^2+3!x^3+\cdots$.
(A) $[-1,1]$ (B) $\{0\}$ (C) $(-\infty,\infty)$ (D) $(-1,1)$

17. Let $x>0$. We define $\ln x=$ (A) $\int_0^x\frac{1}{t}dt$ (B) $\int_1^x\frac{1}{t}dt$ (C) $\int_1^x e^t dt$ (D) $\int_0^x e^t dt$.



$(y=\ln x)$

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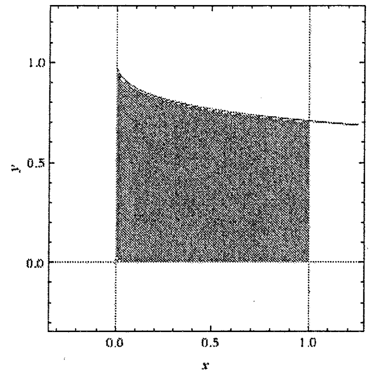
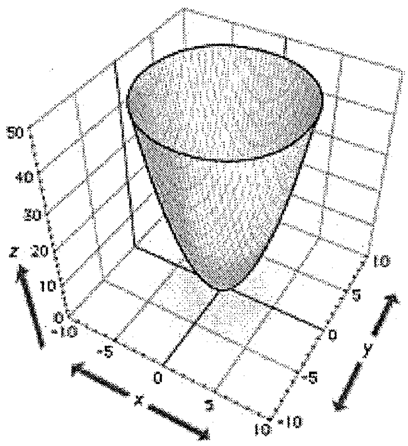
18. $\int_0^1 \frac{1}{\sqrt{1+\sqrt{x}}}dx=$(A)1 (B) $\frac{\sqrt{2}}{3}$ (C) $\frac{\pi}{4}$ (D) $\frac{4}{3}(2^{1.5}-1)-4(2^{0.5}-1)$



19. Find the equation of the tangent plane to the surface $z=x^2+y^2$ at the point $(1,1,1)$.
(A) $2(x-1)+2(y-1)-(z-1)=0$ (B) $2(x-1)+2(y-1)+(z-1)=0$
(C) $3(x-1)+3(y-1)-(z-1)=0$ (D) $3(x-1)+3(y-1)+(z-1)=0$



20. If $a>0$, and the function $f(x)=ax^2+2ax+b$ has the maximum 7 and the minimum 3 on the interval $[-1.1]$ then $a=$ (A)1 (B) 3 (C) 5 (D) 7.