高雄醫學大學九十二學年度學士後醫學系招生考試試題

科目:微積分　　　　考試時間: 80 分鐘　　　　　　　　共 三 頁

說明:一.選擇題用 2B 鉛筆在「答案卡」上作答，修正時應以橡皮擦拭，切勿使用修正液（帶），未遵照正確作答方法而致無法判讀者，考生自行負責。
二.試卷必須繳回，不得攜出試場。

(一) 是非題： 20%。(是，請在答案卡(A)欄位劃記；非，請在答案卡(B)欄位劃記。在其它欄位劃記者，不予計分。每題 2 分，答錯不倒扣。)

1. If $\boldsymbol{f(x) > 1}$ for all $\boldsymbol{x}$ and $\boldsymbol{\lim_{x\to 0} f(x)}$ exists , then $\boldsymbol{\lim_{x\to 0} f(x) > 1}$.

2. If $\sum \boldsymbol{a_n}$ is divergent, then $\sum |\boldsymbol{a_n}|$ is divergent.

3. $\boldsymbol{\int_{-1}^{1}\int_{0}^{1} e^{x^2+y^2} \sin y \, dx\, dy = 0}$.

4. Let $f:[a,b]\to[a,b]$ be a continuous function, then there exists $x\in[a,b]$ such that $f(x)=x$.

5. If $\lim_{x\to a}\frac{f'(x)}{g'(x)}$ doesn't exist, then $\lim_{x\to a}\frac{f(x)}{g(x)}$ doesn't exist too.

6. $\frac{b-a}{1+b^2} < \tan^{-1} b - \tan^{-1} a < \frac{b-a}{1+a^2}$ for $0 \le a < b$.

7. Suppose f is integrable on $[a,b]$, define $F(x)=\int_a^x f(t)dt$, then F is differentiable on (a,b).

8. Let f be a continuous function defined on a closed interval [1, 3] and $f(x)\le 3$ for all $x\in[1,3]$. Define $F(x)=\int_1^x t^2 f(t)dt$ for $x\in[1,3]$, then $F(3)\le 26$.

9. Let f be a function defined on the set $D=\{(x,y)\,|\,-1\le x\le 1, -1\le y\le 1\}$. If $\frac{\partial f}{\partial x}(0,0)$ and $\frac{\partial f}{\partial y}(0,0)$ exist, then f is differentiable at (0,0).

10. Let f be a continuous function defined on the bounded interval (a,b), then there exist a point $x_0\in(a,b)$ such that $f(x)\le f(x_0)$ for all $x\in(a,b)$.

(二) 選擇題： 80%。(單選題，每題 5 分，答錯一題倒扣 1.25 分，倒扣至本大題零分為止，未作答者不給分亦不扣分。)

11. $\int_{-1}^{3}\frac{6x-7}{3x+5}dx =$ __________.

(A) $\boldsymbol{8-\frac{17}{3}\ln 14}$　(B) $\boldsymbol{8-\frac{17}{3}\ln 7}$　(C) $\boldsymbol{8-\frac{\ln 17}{3}}$　(D) $\boldsymbol{4-\frac{17}{3}\ln 14}$　(E) $\boldsymbol{4-\frac{17}{3}\ln 7}$

12. The area between the curve $\boldsymbol{y = x\sqrt{3x+1}}$ and the lines $\boldsymbol{y=0}$, $\boldsymbol{x=0}$ and $\boldsymbol{x=1}$ is __________.

(A) $\boldsymbol{\frac{116}{135}}$　(B) $\boldsymbol{\frac{116}{125}}$　(C) $\boldsymbol{\frac{106}{135}}$　(D) $\boldsymbol{\frac{4}{135}}$　(E) $\boldsymbol{\frac{4}{125}}$

13. Find the equation of the curve that satisfies the differential equation $\boldsymbol{yy' + 2x = 0}$ and that passes through the point $\mathbf{(3,-1)}$.

(A) $-x^2 + 9 = \ln|y|$ (B) $\dfrac{y^2}{2} = -x^2 + \dfrac{11}{2}$ (C) $y^2 + 2x^2 = 19$ (D) $2x^2 - y^2 = 18$ (E) $y^2 - 2x^2 + 17 = 0$

14. If $f(u,v,w)$ is differentiable and $u = x - y$, $v = y - z$ and $w = z - x$, then $\dfrac{\partial f}{\partial x} + \dfrac{\partial f}{\partial y} + \dfrac{\partial f}{\partial z} = ?$

(A) -3 (B) 0 (C) 3 (D) $-\dfrac{\partial f}{\partial u} + \dfrac{\partial f}{\partial v} - \dfrac{\partial f}{\partial w}$ (E) $x\dfrac{\partial f}{\partial x} + y\dfrac{\partial f}{\partial y} + z\dfrac{\partial f}{\partial z}$

15. If $f(x,y) = xe^y$, then the rate of change of f at the point $P(2,0)$ in the direction from P to $Q(\frac{1}{2},2)$ is：

(A) $-\dfrac{11}{2}$ (B) $-\dfrac{5}{2}$ (C) 1 (D) $\dfrac{5}{2}$ (E) $\dfrac{11}{2}$

16. Let $f(x) = \left[\dfrac{(x+1)^4(x-5)^2}{x-1}\right]^{\frac{1}{3}}$, then $f'(2) =$ __________.

(A) 1 (B) 2 (C) 3 (D) –1 (E) –2

17. Suppose a, b>0, then $\lim\limits_{n\to\infty}\sum\limits_{k=1}^{n}\dfrac{1}{an+bk} =$ __________.

(A) $\dfrac{1}{a}\ln\dfrac{a+b}{a}$ (B) $\dfrac{1}{b}\ln\dfrac{a+b}{a}$ (C) $\dfrac{1}{a}\ln\dfrac{a+b}{b}$ (D) $\dfrac{1}{b}\ln\dfrac{a+b}{b}$ (E) $\ln\dfrac{b}{a}$

18. $\int_0^{\frac{\pi}{3}}|\sin x - \cos x|dx =$ __________.

(A) $\dfrac{\sqrt{3}-1}{2}$ (B) $\dfrac{\sqrt{3}+1}{2}$ (C) $2\sqrt{2} - \dfrac{3+\sqrt{3}}{2}$ (D) $2\sqrt{2} - \dfrac{1+\sqrt{3}}{2}$ (E) $\dfrac{1-\sqrt{2}+\sqrt{3}}{2}$

19. Let $f(x) = xe^{-x}$ and $p(x) = a_0 + a_1x + a_2x^2 \ldots + a_nx^n + \ldots$ be the Maclaurin series of $f(x)$, then $a_4 =$ __________.

(A) $\dfrac{1}{3!}$ (B) $\dfrac{-1}{3!}$ (C) $\dfrac{1}{4!}$ (D) $\dfrac{-1}{4!}$ (E) $\dfrac{1}{5!}$

20. The slope of the tangent line to the polar curve $r = \dfrac{\sqrt{2}}{2} + \cos\theta$ at the point $(r,\theta) = (\sqrt{2}, \dfrac{\pi}{4})$ is：

(A) –1 (B) $-\dfrac{1}{2}$ (C) $-\dfrac{1}{3}$ (D) $-\dfrac{2}{3}$ (E) $-\dfrac{3}{2}$

21. The volume of the solid bounded by $z = 2 - x^2 - y^2$ and $z = x^2 + y^2$ is ：

(A) $\dfrac{2}{3}\pi$ (B) $\dfrac{3}{2}\pi$ (C) $\dfrac{3}{4}\pi$ (D) $\dfrac{4}{3}\pi$ (E) π

22. Let $\frac{\sin 2x}{x} \le f(x) \le \frac{e^{2x}-1}{x}$ for $x \in (0,\ 0.5)$, then $\lim\limits_{x\to 0^+}(2f(x))^{f(x)} =$ __________.

(A) 1 (B) 2 (C) 4 (D) 16 (E) e^1

23. Define the function f by $f(x) = \int_0^x (t - t^3)e^t\,dt$. Which of the following statement is *correct*?

(A) Function f derives its absolute maximum at point $x = -1$
(B) Function f derives its absolute maximum at point $x = 0$
(C) Function f derives its absolute maximum at point $x = 1$
(D) Function f derives its absolute minimum at point $x = -1$
(E) Function f does not have absolute maximum or minimum value

24. Define $f(x)=\int_0^x (\cos t)^4\,dt$. Which of the following statement is *false*?

(A) f is a strictly increasing function
(B) $f'(x)=(\cos x)^4$
(C) $f(x+2\pi)-f(x)$ is constant
(D) $f(x)\ge 0$ for all real number x
(E) $f(0)=0$

25. Let $D=\left\{(x,y)\middle|\,0\le x\le \frac{\pi}{2},\ 1\le y\le 2\right\}$, then $\iint_D x\cos(xy)dA$ = ________.

(A) $-\frac{\pi}{2}$ (B) -1 (C) 0 (D) $\frac{\pi}{2}$ (E) 1

26. $\int_1^e x(\ln x)^2\,dx$ = ________.

(A) $-\frac{1}{4}(e^2+1)$ (B) $\frac{1}{4}(e^2-1)$ (C) $\frac{1}{4}(1-e^2)$ (D) $\frac{1}{4}(e^2+1)$ (E) $-\frac{1}{4}(e+1)$

高雄醫學大學 92 年度學士後西醫招生考試試題詳解

科目：微積分

徐中老師解題

1. (B)

理由：(舉例說明)

$$f(x)=\begin{cases} -\dfrac{x^2+1}{x^4+1} & 0<|x|<1 \\ 2 & otherwise \end{cases}$$

則 $f(x)>1 \quad for\ all\ x$

而 $\lim\limits_{x\to 0} f(x)=\lim\limits_{x\to 0}\dfrac{x^2+1}{x^4+1}=1$

2. (A)

理由：(證明如下)

$\because\ \sum|a_n|\ conv. \Rightarrow \sum a_n\ \ conv.$

其對偶命題為真：

$\sum|a_n|\ div \Leftarrow \sum a_n\ \ div$

3. (A)

理由：(證明如下)

$$\int_{-1}^{1}\int_{0}^{1} e^{x^2+y^2}\sin y\, dx\, dy$$

$$=\int_{-1}^{1}\left[\int_{0}^{1} e^{x^2+y^2}\sin y\, dx\right]dy=\left[\int_{-1}^{1} e^{y^2}\sin y\right]\cdot\left[\int_{0}^{1} e^{x^2}dx\right]$$

$=0\quad \left(\because e^{y^2}\sin y\ \text{為奇函數},\ \therefore \int_{-1}^{1} e^{y^2}\sin y\, dy=0\right)$

4. (A)

理由：(證明如下)

(情況一)

$f\ (a)=a$ **或** $f\ ($

則存在 $\ a\in[a,b$

使得 $f\ (a)=a$ 或

$f\ (a)\neq a$ **且** $f\ (b)\neq b$

令 $g(t)=f(t)-t$

則 $g(t)\, e\ \ cont.on\ \ [a,b]$

$g(a)=f(a)-a>0\quad (\because f(a)\in[a,b],\text{且 } f(a)\neq a)$

$g(b)=f(b)-b<0\quad (\because f(b)\in[a,b],\text{且 } f(b)\neq b)$

$\therefore g(a)\cdot g(b)<0$

由中值定理可得：

(情況二)

$\exists\, x \in (a,b) \subset [a,b]$

$\ni g(x)=0$, $i.e.\ f(x)-x=0$, $i.e. f(x)=x$

綜合（情況一）（情況二）得證

5.（B）

理由：(舉例說明)

例如：

$f(x)=x^4 \qquad f'(x)=4x^3$

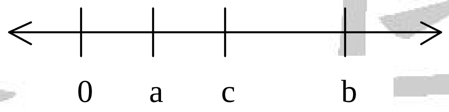
$g(x)=x^2-2x \qquad g'(x)=2x-2$

$\ell im_{x\to1}\dfrac{f'(x)}{g'(x)}=\ell im_{x\to1}\dfrac{4x^3}{2x-2}\to$ **不存在**

但 $\ell im_{x\to1}\dfrac{f(x)}{g(x)}-\ell im_{x\to1}\dfrac{x^4}{x^2-2x}=-1$

6.（A）

理由：(證明如下)



令 $f(x)=tan^{-1}x$

$f(x)\ \boldsymbol{e}\ \ cont.on\ \ [a,b]$

$f'(x)=\dfrac{1}{1+x^2}\ \ \boldsymbol{e}\ Def.on\ \ [a,b]\ \ b>a>0$

由 MVT **得：** $\exists\, c\ (a<c<b)$

$\ni :\ f'(c)=\dfrac{f\ (b)-f\ (a)}{b-a}=\dfrac{\tan^{-1}b-\tan^{-1}a}{b-a}$

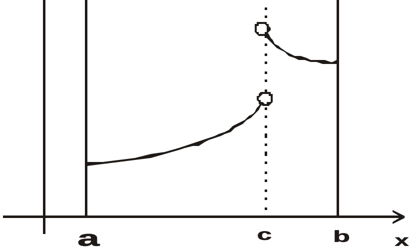
而 $f'\ (x)\ \boldsymbol{e}\ \ \downarrow\ \ on\,[a,b]$

$\therefore\ f'(b)<f'(c)<f'(a)$

$i.e.\dfrac{1}{1+b^2}<\dfrac{\tan^{-1}b-\tan^{-1}a}{b-a}<\dfrac{1}{1+a^2}$

$\therefore \dfrac{b-a}{1+b^2}<\tan^{-1}b-\tan^{-1}a<\dfrac{b-a}{1+a^2}$

7.（B）



理由：

考慮函數 $f(x)$ **如圖示**

顯然 $f(x)$ **為分段式連續**

(*piecewisely continuous*)

$\therefore f(x)\, e \ \ integrable\ on\ [a,b]$

而 $F(x)=\int_a^x f(t)dt$, $F'(c)$**不存在** $(\because f(c)$**不存在**$)$

$\therefore F(x)\ \ \notin\ \ differentiable\ at\ \ \ x=c$

$\therefore F(x)\ \ \notin\ \ differentiable\ on\ (a,b)$

8. (A)

理由：(證明如下)

$F(3)=\int_1^3 t^2 f(t)dt \le \int_1^3 t^2\cdot 3dt\ \left(\because f(t)\le 3 \text{且} t^2\ge 0\right)$

$=t^3\Big|_1^3=26$

9. (B)

理由：(舉例如下)

例如：

$$f(x,y)=\begin{cases}\dfrac{xy}{x^2+y^2} & (x,y)\ne(0,0)\\ 0 & (x,y)=(0,0)\end{cases}$$

顯然 $f_x(0,0)=0$, $f_y(0,0)=0$

但是 $f(x,y)$ **在** $(0,0)$ **不可微**

$\left(\because \lim\limits_{(x,y)\to(0,0)} f(x,y)\ \text{不存在} \Rightarrow f(x,y)\ \text{在}\ (0,0)\ \text{不連續}\right)$

10. (B)

理由：(舉例如下)

例如函數 $f(x)$**如圖示：**

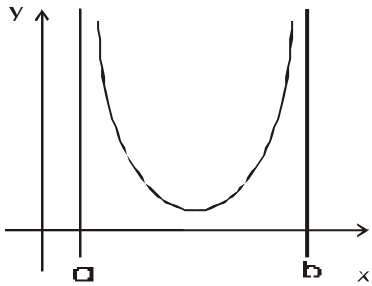
$f(x)\, e\ \ cont.on\ \ (a,b)$

且 $f(x)$**在** $x=a$ **,及** $x=b$ **呈**

無窮不連續

顯然無法找到 $x_0\in(a,b)$

使得 $f(x)\le f(x_0)$



11.(B)

$\int_{-1}^{3}\frac{6x-7}{3x+5}dx=\int_{-1}^{3}(2-\frac{17}{3x+5})dx=\left[2x-\frac{17}{3}\ell n(3x+5)\right]\Big|_{-1}^{3}=8-\frac{17}{3}\ell n7$

12.(A)

$$A=\int_0^1 x\sqrt{3x+1}\,dx$$

令 $\sqrt{3x+1}=y \Rightarrow 3x+1=y^2$, $3x=y^2-1$, $x=\frac{1}{3}(y^2-1)$, $dx=\frac{2}{3}y\,dy$

$$\therefore A=\int_1^2\frac{1}{3}(y^2-1)\cdot y\cdot\frac{2}{3}ydy=\frac{2}{9}\int_1^2(y^4-y^2)dy=\frac{2}{9}\left(\frac{1}{5}y^5-\frac{1}{3}y^3\right)\Big|_1^2=\frac{2}{9}\cdot\frac{58}{15}=\frac{116}{135}$$

13.(C)

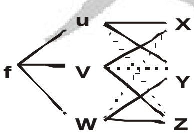
依題可得微方 $\begin{cases} yy'+2x=0\cdots(1) \\ y(3)=-1 \quad \cdots(2) \end{cases}$

$(1)\,yy'=-2x \Rightarrow y\frac{dy}{dx}=-2x \Rightarrow ydy=-2xdx$

$\Rightarrow$ **通解**$:\frac{1}{2}y^2=-x^2+C$, **再將** $y(3)$**帶入通解中**, **可得**$C=\frac{19}{2}$

$\therefore$ **所求特解**$:\frac{1}{2}y^2=-x^2+\frac{19}{2}$, $i.e.\ y^2+2x^2=19$

14.(B)



$$\frac{\partial f}{\partial x}+\frac{\partial f}{\partial y}+\frac{\partial f}{\partial z}=\frac{\partial f}{\partial u}\cdot\frac{\partial u}{\partial x}+\frac{\partial f}{\partial v}\cdot\frac{\partial v}{\partial x}+\frac{\partial f}{\partial w}\cdot\frac{\partial w}{\partial x}+\frac{\partial f}{\partial u}\cdot\frac{\partial u}{\partial y}+\frac{\partial f}{\partial v}\cdot\frac{\partial v}{\partial y}+\frac{\partial f}{\partial w}\cdot\frac{\partial w}{\partial y}+\frac{\partial f}{\partial u}\cdot\frac{\partial u}{\partial z}$$

$$+\frac{\partial f}{\partial v}\cdot\frac{\partial v}{\partial z}+\frac{\partial f}{\partial w}\cdot\frac{\partial w}{\partial z}$$

$$=\frac{\partial f}{\partial u}\cdot 1+\frac{\partial f}{\partial v}\cdot 0+\frac{\partial f}{\partial w}\cdot(-1)+\frac{\partial f}{\partial u}\cdot(-1)+\frac{\partial f}{\partial v}\cdot 1+\frac{\partial f}{\partial w}\cdot 0+\frac{\partial f}{\partial u}\cdot 0+\frac{\partial f}{\partial v}\cdot(-1)+\frac{\partial f}{\partial w}\cdot 1=0$$

15 .(C)

$$\overrightarrow{PQ}=\left[-\frac{3}{2}\,,\,2\right],\ \hat{e}_{\overrightarrow{PQ}}=\frac{\overrightarrow{PQ}}{\left\|\overrightarrow{PQ}\right\|}=\frac{\left[-\frac{3}{2}\,,\,2\right]}{\sqrt{(\frac{3}{2})^2+2^2}}=\frac{\left[-\frac{3}{2}\,,\,2\right]}{\frac{5}{2}}=\left[-\frac{3}{5},\frac{4}{5}\right]$$

$$\nabla f(2\,,\,0)=\left[f_x(2\,,0)\,,\ f_y(2\,,\,0)\right]=[1\,,\,2]$$

$$\therefore\ D_{\hat{e}}f(2\,,\,0)=\nabla f(2\,,\,0)\cdot\hat{e}_{\overline{PQ}}=[1\,,\,2]\cdot\left[-\frac{3}{5},\frac{4}{5}\right]=1$$

16.(D)

$$\ell n f(x)=\frac{1}{3}\big[4\,\ell n|x+1|+2\,\ell n\,|x-5|-\ell n|x-1|\big]$$

$$\Rightarrow \frac{1}{f(x)}\,f'(x)=\frac{1}{3}\left[4\cdot\frac{1}{x+1}+2\cdot\frac{1}{x-5}-\frac{1}{x-1}\right]$$

$$\therefore\ f'(x)=\frac{1}{3}\,f(x)\left[4\cdot\frac{1}{x+1}+2\cdot\frac{1}{x-5}-\frac{1}{x-1}\right]$$

$$f'(2)=\frac{1}{3}\,f(2)\left[4\cdot\frac{1}{2+1}+2\cdot\frac{1}{2-5}-\frac{1}{2-1}\right]=\frac{1}{3}\cdot 9\cdot\left[\frac{4}{3}-\frac{2}{3}-1\right]=-1$$

17.(B)

$$\ell im_{n\to\infty}\sum_{k=1}^{n}\frac{1}{an+bk}=\ell im_{n\to\infty}\sum_{k=1}^{\infty}\frac{1}{n}\cdot\frac{1}{a+b\dfrac{k}{n}}=\int_0^1\frac{1}{a+bx}\,dx=\frac{1}{b}\cdot\ell n(a+bx)\Big|_0^1=\frac{1}{b}\,\ell n\,\frac{a+b}{a}$$

18.(C)

$$\int_0^{\frac{\pi}{3}}|\sin x-\cos x|\,dx=\int_0^{\frac{\pi}{4}}|\sin x-\cos x|\,dx+\int_{\frac{\pi}{4}}^{\frac{\pi}{3}}|\sin x-\cos x|\,dx$$

$$=\int_0^{\frac{\pi}{4}}(\cos x-\sin x)\,dx+\int_{\frac{\pi}{4}}^{\frac{\pi}{3}}(\sin x-\cos x)\,dx=(\sin x-\cos x)\Big|_0^{\frac{\pi}{4}}+(-\cos x-\sin x)\Big|_{\frac{\pi}{4}}^{\frac{\pi}{3}}$$

$$=\left[\left(\frac{\sqrt{2}}{2}-\frac{\sqrt{2}}{2}\right)-(0+1)\right]+\left[\left(-\frac{1}{2}-\frac{\sqrt{3}}{2}\right)-\left(-\frac{\sqrt{2}}{2}-\frac{\sqrt{2}}{2}\right)\right]=2\sqrt{2}-\frac{3+\sqrt{3}}{2}$$

19.(B)

$$f(x)=xe^{-x}=x\sum_{n=0}^{\infty}\frac{1}{n!}(-x)^n=\sum_{n=0}^{\infty}\frac{1}{n!}(-1)^n x^{n+1}=\sum_{n=0}^{\infty}a_n x^n$$

x^4**係數**: $a_4=\frac{1}{3!}(-1)^3\Rightarrow a_4=-\frac{1}{3!}$

20.(C)

$$m(\theta)=\frac{f'(\theta)\sin\theta+f(\theta)\cos\theta}{f'(\theta)\cos\theta-f(\theta)\sin\theta}$$, **其中** $f(\theta)=\frac{\sqrt{2}}{2}+\cos\theta$, $f'(\theta)=-\sin\theta$

$$\therefore m\left(\frac{\pi}{4}\right)=\frac{f'(\frac{\pi}{4})\sin\frac{\pi}{4}+f(\frac{\pi}{4})\cos\frac{\pi}{4}}{f'(\frac{\pi}{4})\cos\frac{\pi}{4}-f(\frac{\pi}{4})\sin\frac{\pi}{4}}=\frac{(-\frac{\sqrt{2}}{2})\cdot(\frac{\sqrt{2}}{2})+(\frac{\sqrt{2}}{2}+\frac{\sqrt{2}}{2})\cdot\frac{\sqrt{2}}{2}}{(-\frac{\sqrt{2}}{2})\cdot(\frac{\sqrt{2}}{2})-(\frac{\sqrt{2}}{2}+\frac{\sqrt{2}}{2})\cdot\frac{\sqrt{2}}{2}}=-\frac{1}{3}$$

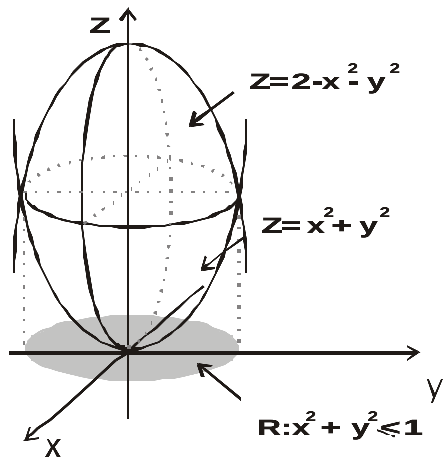
21.(E)

$V=\iint_R\left[(2-x^2-y^2)-(x^2+y^2)\right]dxdy$

$=\int_0^{2p}\left[\int_0^1 2\cdot(1-r^2)rdr\right]d\boldsymbol{q}$

$=\left[\int_0^{2p}\ d\boldsymbol{q}\right]\cdot\left[\int_0^1 2(1-r^2)rdr\right]$

$=2\boldsymbol{p}\cdot\dfrac{1}{2}=\boldsymbol{p}$



22.(D)

$\dfrac{\sin\ 2x}{x}\le f(x)\le\dfrac{e^{2x}-1}{x}\quad 0<x<0.5$

$\lim\limits_{x\to0^+}\dfrac{\sin\ 2x}{x}\overset{L'HR}{=}\lim\limits_{x\to0^+}\dfrac{2\cos 2x}{1}=2$, $\lim\limits_{x\to0^+}\dfrac{e^{2x}-1}{x}\overset{L'HR}{=}\lim\limits_{x\to0^+}\dfrac{2e^{2x}}{1}=2$

$\therefore\lim\limits_{x\to0^+} f(x)=2$ (**根據夾擊原理**) $\therefore\lim\limits_{x\to0^+}(2f(x))^{f(x)}=(2\cdot2)^2=16$

23.(C)

$f(x)=\int_0^x(t-t^3)\,e^t dt\quad \boldsymbol{e}\ \ cont.on\,(-\infty,\infty)$

$f'(x)=(x-x^3)e^x=-e^x(x+1)x(x-1)$

臨界數 $:-1,0,1\quad(f'(x)=0)$

x	$(-\infty,-1)$	-1	(-1,0)	0	(0,1)	1	$(1,\infty)$
$f'(x)$	+	0	-	0	+	0	-
	↗		↘		↗		↘

相對極大 $f(-1)=\int_0^{-1}(t-t^3)e^t dt=e^t(-t^3+3t^2-5t+5)\Big|_0^{-1}=\dfrac{14}{e}-5$

相對極大 $f(1)=\int_0^1(t-t^3)e^t dt=e^t(-t^3+3t^2-5t+5)\Big|_0^1=2e-5$

相對極小 $f(0)=\int_0^0(t-t^3)e^t dt=0$

而 $2e-5>\dfrac{14}{e}-5$, $\therefore$ **得絕對極大** $f(1)$

24.(D)

$(\cos t)^4>0,\forall t\qquad\therefore\int_0^x(\cos t)^4 dt\le0\quad\forall x<0$

25.(C)

$$\iint_D x\cos xy\,dA=\int_0^{\frac{p}{2}} x\left[\int_1^2 \cos xy\,dy\right]dx=\int_0^{\frac{p}{2}} x\cdot\left[\frac{1}{x}\sin\ xy\Big|_1^2\right]dx=\int_0^{\frac{p}{2}}(\sin\ 2x-\sin\ x)dx$$

$$=-\frac{1}{2}\cos 2x+\cos x\Big|_0^{\frac{p}{2}}=\left[-\frac{1}{2}(-1`)+0\right]-\left[-\frac{1}{2}+1\right]=0$$

26.(B)

$$\int_1^e x(\ell nx)^2\,dx=\frac{1}{4}x^2(2(\ell nx)^2-2\ell nx+1)\Big|_1^e$$

$$=\frac{1}{4}e^2(2\cdot 1^2-2\cdot 1+1)-\frac{1}{4}\cdot 1^2\cdot(2\cdot 0^2-2\cdot 0+1)=\frac{e^2}{4}-\frac{1}{4}=\frac{1}{4}(e^2-1)$$