Higher Institute of Engineering — Math. (Calculus II)

6^{th} of October City — I — 2006/2007

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(1)Find $(AB)^{-1}$ where $A = \begin{bmatrix} 2 & 0 & 1 \\ 0 & 1 & -3 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 \\ 2 & 1 \\ 1 & 1 \end{bmatrix}$

(2)Compute the sum: $\sum_{r=1}^{20} \frac{6}{(3r-1)(3r+2)}$

(3)Solve the equation $z^3 = 2 + 2i$

(4)Test the series (a) $\sum_{n=1}^{\infty} \frac{3^n}{(n+2)!}$ (b) $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^3+2}$

(5)If $f(x, y) = e^{xy}$. Find f_x, f_{xx}, f_y and the maximum (minimum) values

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Higher Institute of Engineering Math. (Calculus II)

6^{th} of October City II 2006/2007

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(1)Find $(A-B)^{-1}$ where $A=\begin{bmatrix}2 & 3 & 1\\ 0 & -1 & 2\\ 2 & 1 & -1\end{bmatrix}$, $B=\begin{bmatrix}1 & 3 & -1\\ 3 & 1 & 1\\ 2 & 2 & 1\end{bmatrix}$

(2)Compute the sum of the series $\sum_{r=1}^{20} \frac{8}{(4r-3)(4r+1)}$

(3)Find u(x,y) and v(x,y) of the function $f(z)=e^{2z}$ and show that $u_{xx}+u_{yy}=0$

(4)Test the series (a) $\sum_{n=1}^{\infty} n\left(\frac{2}{3}\right)^n$ (b) $\sum_{n=1}^{\infty} \frac{(-3)^n}{(2n+1)^n}$

(5)Find the extrema of the function $f(x,y)=x^2+3y^2+2x-12y+2$

Higher Institute of Engineering
6^{th} of October City

III

Math. (Calculus II)
2006/2007

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(1)Find $A^t.B$, $B^t.A$ where $A=\begin{bmatrix}1 & 2\\ 0 & 1\\ 2 & 1\end{bmatrix}$, $B=\begin{bmatrix}3 & 1\\ 0 & 1\\ 2 & 1\end{bmatrix}$

(2)Compute the sum: $\sum_{r=1}^{20}(r+1)(2r+3)$

(3)Solve the equation $z^4=-16i$

(4)(a)Test $\sum_{n=1}^{\infty}\frac{2^n}{2n+1}$ (b)Determine the interval of convergence of $\sum_{n=1}^{\infty}\frac{\sqrt{n}}{n+3}(x-2)^n$

(5)If $f(x,y)=3y+y^3-3yx^2$. Show that $f_{xx}+f_{yy}=0$

Ministry Of Higher Education Higher Institute of Engineering 6th of October City Department of Basic Science	Prep. Year: Final Exam Mathematics: (Calculus II) Course Code, BAS 115 June, 11, 2007

الامتحان مكون من (5) أسئلة فى صفحة واحدة و المطلوب الإجابة عن كل الأسئلة الزمن: 3 ساعات

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(1)(a)Find AB and |AB| where $A=\begin{bmatrix}2 & 0\\ 1 & 3\\ 3 & -1\end{bmatrix}$, $B=\begin{bmatrix}1 & 2 & -2\\ 2 & 0 & 3\end{bmatrix}$

(b)Test the series: (i) $\sum_{n=1}^{\infty}\frac{n}{n^4+4}$ (ii) $\sum_{n=1}^{\infty}\frac{(-1)^n}{n^3+4}$

(2)(a)Determine the interval of convergence of the series $\sum_{n=1}^{\infty}\frac{n}{\sqrt{n+1}}(x-2)^n$

(b)Compute the sum of the series $\sum_{r=1}^{20}(r+2)(2r+3)$

(c)Find u(x,y), v(x,y) of the complex function f(z) = $z+\sin z$ and $u_{xx}+u_{yy}$

(3)(a)Obtain the maximum and minimum values of the function:

$f(x,y)=x^3+y^2-27x-4y+3$

(bFind the envelope of the curves: $(x-\alpha)^2+y^2=4\alpha$

(c)Verify Euler,s theorem for $f(x,y,z)=x^2+y^2-3z^2-4xy$. Also, find ∇f

(4)(a)Find $\overline{U}.\overline{V}$, $\overline{U}x\overline{V}$ where $\overline{U}=2i+j+2k$ and $\overline{V}=i+2j-2k$. Also, find the angle between $\overline{U},\overline{V}$.

(b)If $\overline{U}=(xyz)i+(2xz+y)j+(z\sin y)k$. Find $\nabla.\overline{U}$ and $\nabla x\overline{U}$

(c)Evaluate $\int_{(0,0)}^{(1,1)}(3x^2+4y)\,dx+(4x+2y)dy$, through the curve y = x^3

(5)(a)Evaluate the integrals: (i) $\int_0^2\int_0^x(3x+3y^2)\,dydx$ (ii) $\int_0^2\int_0^{\sqrt{4-x^2}}\sqrt{x^2+y^2}\,dydx$

(b)Verify Green's theorem for the integral $\oint_C(3x^2+2y)\,dx+(2x^2+y)dy$,

where C is formed by: $y=\sqrt{4-x^2}$, y = 0

Good Luck Dr. Mohamed H. Eid