诚信应考,考试作弊将带来严重后果!

华南理工大学期末考试

《 2020 Exam Calculus A》试卷

注意事项：1. 考前请将密封线内填写清楚；

2. 所有答案请直接答在试卷上(或答题纸上)；

3. 考试形式：闭卷；

4. 本试卷共 8 大题，满分 100 分， 考试时间 120 分钟。

题号						
得 分						
评卷人						

1. Answer the questions (20):

(1) The series as absolutely convergent, conditionally convergent or divergent series

$$\sum_{n=1}^{\infty}\left(\frac{n+1}{n+2}\right)^{n}$$

Answer -----------------

(2) Suppose $ye^{-x}+z\sin x=0$, find $\partial z/\partial x$

Answer -----------------

(3) Find $div(\vec{F})$ *and* $curl\,(\vec{F})$ if $\vec{F}=x^2yz\,\vec{i}+3xyz^3\,\vec{j}+(x^2-z^2)\,\vec{k}$

Answer -----------------

(4) Solve differential equation $y''''-2y'''+5y''=0$

Answer -----------------

(4’) Does the limit $\lim\limits_{(x,y)\to(0,0)}\dfrac{xy+\cos x}{xy-\cos x}$ exist?

Answer -----------------

(5) Find f such that $\vec{F}=\nabla f$, while

$$\vec{F}=\left(45x^4y^2-6y^6+3\right)\mathbf{i}+\left(18x^5y-12xy^5+7\right)\mathbf{j}$$

Answer -----------------

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（密封线内不答题）

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2. Evaluate the problems (30):

(1) Test for the convergence or divergence $\sum_{n=1}^{\infty} \frac{n}{n5^n + 2}$

(2) Find the convergence set for the power series

$$\sum_{n=0}^{\infty} \frac{(x-1)^n}{(n+1)^2}$$

(3) Find the equation of the plane through $(6,2,-1)$ and perpendicular to the line of intersection of planes $4x-3y+2z+5=0$ and $3x+2y-z+11=0$

(4) Find the minimize $z = x - \frac{x^3}{8} - \frac{y^2}{3}$ subject to $\frac{x^2}{16} + y^2 = 1$

(5) Evaluate $\int_1^2 \int_0^{\sqrt{2x-x^2}} \left(x^2 + y^2\right)^{-1/2} dxdy$.

3. (10) Evaluate the flux of $\vec{F}$ across G. Where $\vec{F} = x\mathbf{i} + y\mathbf{j} + z\mathbf{k}$, G is the surface above x, y plane determined by $z = 1 - x^2 - y^2 \quad -\infty < x < +\infty,\ -\infty < y < +\infty,$ and the normal direction upward

4. (10) $\oint_C (x^2 + 4xy)dx + (2x^2 + 3y)dy$ where C is the ellipse $9x^2 + 16y^2 = 144$

5. (5) Evaluate $\int_C \left(1-y^2\right) ds$; C is the quarter circle from $(0,-1)$ *to* $(1,0)$ center at the origin

6. (7) Solve differential equation $y''+y=\sec x$

6'. (7) Suppose that a differentiable function $f(x,y)$ satisfies $f(tx,ty)=tf(x,y)$ for all $t>0$. Show that $f(x,y)=x\dfrac{\partial f}{\partial x}+y\dfrac{\partial f}{\partial y}$.

7. (8) Evaluate the $\iint_{\partial S} \vec{F} \cdot \vec{n}\, dS$. Where

$\vec{F}(x, y, z) = (x^2 + \cos yz)\vec{i} + (y - e^z)\vec{j} + (z^2 + x^2)\vec{k}$.

S is the solid bounded by $x^2 + y^2 = 4, x + z = 2, z = 0$.

8. (10) Evaluate $\int_{-3}^{3} \int_{-\sqrt{9-x^2}}^{\sqrt{9-x^2}} \int_{-\sqrt{9-x^2-z^2}}^{\sqrt{9-x^2-z^2}} (x^2 + y^2 + z^2)^{3/2} dydzdx$