Calculus II

2018/05/15

Second Midterm

考試注意事項：

1. 答案紙直行對折，兩直欄書寫作答。題號請標示清楚在答案紙上。
2. 無清楚計算過程，不予計分。
3. 沒依題目要求，不予計分。

試題：

1. (15%) Determine whether the series $\sum_{n=1}^{\infty}(-1)^{n-1}\frac{n^2+1}{2^n}$ is absolutely convergent, conditional convergent, or divergent.

2. (15%) Find the radius of convergence and the interval of convergence of $\sum_{n=1}^{\infty}\frac{x^n}{n}$.

3. (15%) Let $f(x)=e^x$. Find the Maclaurin series of f, and determine its radius of convergence.

4. (15%) Find $\frac{d^2y}{dx^2}$ if $x=t^2-4$ and $y=t^3-3t$.

5. (10%) Write $\mathbf{b}=3\mathbf{i}-\mathbf{j}+2\mathbf{k}$ as the sum of a vector parallel to $\mathbf{a}=2\mathbf{i}-\mathbf{j}+\mathbf{k}$ and a vector perpendicular to $\mathbf{a}$.

6. (10%) Find the area of the triangle with vertices $P(3,-3,0)$, $Q(1,2,2)$, and $R(1,-2,5)$.

7. (10%) Find an equation of the plane containing the points $P(3,-1,1)$, $Q(1,4,2)$ and $R(0,1,4)$.

8. (10%) Find the antiderivative of $\mathbf{r}'=\cos t\mathbf{i}+e^{-t}\mathbf{j}+\sqrt{t}\mathbf{k}$ satisfying the initial condition $\mathbf{r}(0)=\mathbf{i}+2\mathbf{j}+3\mathbf{k}$.