※ 注意: 請於答案卷上依序作答, 並標明大題及其題號。

A. (8 points for each of the following 10 blanks.)

♦ The radius of convergence of the series $\sum_{n=1}^{\infty}[csch(n)]\,x^n =$ $\underline{(1)}$.

♦ If $w = x + 2y + z^2$, $x = \frac{r}{s}$, $y = r^2 + \ln s$, and $z = 2r$, then $\frac{\partial w}{\partial r}$ can be expressed in terms of r and s as $\underline{(2)}$.

♦ The tangent plane at the point $(0, 1, 2)$ on the surface $\cos \pi x - x^2 y + e^{xz} + yz = 4$ is $\underline{(3)}$.

♦ The maximum value of the function $f(x, y, z) = x+2y+3z$ subject to the constraint $x^2 + y^2 + z^2 = 25$ is $\underline{(4)}$.

♦ By using Taylor's formula, a quadratic approximation of $f(x, y) = \cos x \cos y$ at the origin can be found to be $\underline{(5)}$.

♦ $\int_0^{\pi/2} \cos^3 x \sin 2x\, dx = \underline{(6)}$.

♦ It is known that $f(x) + \int_0^x e^{2t} f'(t)\, dt = x$. Then $\lim_{x\to\infty} e^{2x} f'(x) =$ $\underline{(7)}$ and $\lim_{x\to\infty} f(x) = \underline{(8)}$.

♦ $\int_0^1 \int_{y^2}^1 e^{\sqrt{x}} dx dy = \underline{(9)}$.

♦ The value of a for which $\int_1^{\infty} (\frac{ax^2}{x^3+1} - \frac{1}{2x}) dx$ converges is $\underline{(10)}$.

B. (10 points)

♦ Use the definition of right-hand limit to show that $\lim_{x\to 1^+}(5x - 3) = 2$.

C. (10 points)

♦ Calculate the area enclosed by $y^2 = 2x$, $x + y = 4$, and $x + y = 12$. Please show your calculation.