

答案請寫於答案卷上

需列計算過程，否則不予計分

填充計算題（總計10題，每題10分）

1. Find $\lim_{x \rightarrow 0} \frac{x^2}{\sec x - 1} = \underline{\hspace{2cm}}$.
2. Find $\int \frac{\sec^2 x}{9 + \tan^2 x} dx = \underline{\hspace{2cm}}$.
3. Find $\int_0^{\pi/2} \sin nx \cos nx dx = \underline{\hspace{2cm}}$.
4. Find $\int \frac{1}{3 \sin x - 4 \cos x} dx = \underline{\hspace{2cm}}$.
5. Find the points of intersection of two polar curves, $r = 2 \sin \theta$ and $r = 2 \sin 2\theta$, if any. $\underline{\hspace{2cm}}$.
6. Find the limit of the sequence $\left\{ \frac{\sqrt{n} \sin(e^n \pi)}{n+1} \right\} = \underline{\hspace{2cm}}$.
7. $\lim_{n \rightarrow \infty} (\sqrt{n^2 + n} - n) = \underline{\hspace{2cm}}$.
8. $\int_{-\infty}^{\infty} \frac{e^x}{1 + e^{2x}} dx = \underline{\hspace{2cm}}$.
9. Find the point that the sphere $x^2 + y^2 + z^2 - 8x - 8y - 6z + 24 = 0$ is tangent to the ellipsoid $x^2 + 3y^2 + 2z^2 = 9$. $\underline{\hspace{2cm}}$.
10. $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^2 \sin(x^2 + y^2) dz dy dx = \underline{\hspace{2cm}}$.