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※請注意：答案須寫在答案卷上，否則不予計分。

計算題 (共 100 分)

1. $\sin(xy) + x + y^2 = 0$, find $\frac{dy}{dx}$ (10%)

2. $\lim_{x \rightarrow 0} \frac{\tan 3x}{7x}$. (10%)

3. $f(x) = x^2 \tan(x)e^{2x}$, find $\frac{df(x)}{dx}$. (10%)

4. $x^2 y''(x) - 2xy'(x) + 2y(x) = 0$ find $y(x)$. (10%)

5. $\int_0^{\infty} x e^{-2x} dx$. (10%)

6. Find the general solution of $\frac{d^2 y}{dx^2} + 3\frac{dy}{dx} + 2y = 6e^x$. (10%)

7. Solve the couple system: (15%)

$$2\frac{dx}{dt} + \frac{dy}{dt} - 4x - y = e^t$$

$$\frac{dx}{dt} + 3x + y = 0$$

$$x(0) = y(0) = 0$$

8. $6 + \int_a^x \frac{f(t)}{t^2} dt = 2\sqrt{x}$, (for all $x > 0$). Find $f(x)$ and a . (10%)

9. Compute the line integral of $\vec{v} = 6\hat{x} + yz^2\hat{y} + (3y + z)\hat{z}$ along the triangular path shown in the following figure. (15%)

