

考生注意: 1. 依次序作答, 只要標明題號, 不必抄題。

2. 答案必須寫在答案卷上, 否則不予計分, 並限以藍黑色筆作答。

3. 試題隨卷繳回。(詳閱詳閱試場規則)

1. Use the double integral to find the volume of the solid bounded above by the plane $z=3+x-y$ and below by the region bounded by $y=x$, $x=4$, and $y=0$. Reverse the order of integration and evaluate. (10%)
2. The rate of increase in monthly sales, S , of a new product is proportional to the sales of the product, S , and $1000-S$. If monthly sales are 100 units when $t=0$ and 400 units after one month at $t=1$, what will sales be after two months, at time $t=2$? (20%)
3. Approximate the following definite integral with a Taylor polynomial of degree 6 centered at 0. (20%)

$$\int_0^1 \cos 3x dx$$

考生注意：1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分，並限以藍黑色筆作答。
3. 試題隨卷撤回。(餘詳閱試場規則)

4. (30%，每一小題 5%) 求算以下積分值：

a. $\int (1-x^2) \cdot \sqrt{x} \sqrt{x} dx$

b. $\int x^2 \cdot \sqrt[3]{1+x^3} dx$

c. $\int \frac{x^2}{(1-x)^{100}} dx$

d. $\int \frac{1}{e^{\frac{x}{2}} + e^x} dx$

e. $\int \frac{x^3+1}{x^3-5x^2+6x} dx$

f. $\int \sqrt{\frac{x}{1-x\sqrt{x}}} dx$

5. (20%) 若 $C_0 = S_0 N(d_1) - Ke^{-rt} N(d_2)$

式中：

$$d_1 = \frac{\ln \frac{S_0}{K} + (r + \frac{1}{2}\sigma^2)T}{\sigma\sqrt{T}}$$

$$d_2 = d_1 - \sigma\sqrt{T}$$

$$N(z) = \int_{-\infty}^z \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}} dX, \quad N'(z) = n(z) = \frac{dN(z)}{dz} = \frac{1}{\sqrt{2\pi}} e^{-\frac{z^2}{2}}$$

求算 $\frac{\partial C_0}{\partial S_0}$