

## Final Test

考試注意事項：

1. 答案紙直行對折，兩直欄書寫作答。
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%) If  $y = \int_0^{x^3} \cos t^2 dt$ , what is  $\frac{dy}{dx}$ ?
2. (15%) Suppose that  $g$  is the inverse of a differentiable function  $f$  and  $H = g \circ g$ . If  $f(4) = 3$ ,  $g(4) = 5$ ,  $f'(4) = \frac{1}{2}$ , and  $f'(5) = 2$ , find  $H'(3)$ .
3. (15%) Find the derivative of  $f(x) = x^x$ .
4. (15%) Evaluate  $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x$ .
5. (10%) Find the area of the region bounded by the graph of  $x = y^2$  and  $y = x - 2$ .
6. (10%) Find the volume of the solid obtained by revolving the region bounded  $y = \sqrt{x}$  and  $y = x$  about the  $x$ -axis.
7. (10%) Let  $R$  be the region bounded by the graph of  $x = -y^2 + 6y$  and  $x = 0$ . Find the volume of the solid obtained by revolving  $R$  about the  $x$ -axis.
8. (10%) Find  $\int \frac{1}{\sqrt{1-9x^2}} dx$ .