Calculus I

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. 未依題目要求作答，不予計分。

試題：

1. (15%) Find $\displaystyle\int \sec x \, dx$.

2. (15%) If $f(x) = \displaystyle\int_2^x \frac{dt}{\sqrt{1+t^3}}$, where $x > -1$, what is $(f^{-1})'(0)$?

3. (15%) Find the integral $\displaystyle\int 2^x \sin(2^x) \, dx$

4. (15%) Use **l'Hôpital's rule** to evaluate $\displaystyle\lim_{x \to \infty} \left(1 + \frac{1}{x}\right)^x$.

5. (10%,10%) Let R be the region bounded by the graphs of $y = x^2 + 1$, $y = -x + 1$, and $x = 1$. Find the volume of the solid that is obtained by revolving R about the y-axis using

   (a) the method of washers and
   (b) the method of cylindrical shell.

6. (10%) Find the derivative of $y = \ln(e^{2x} + e^{-2x})$.

7. (10%) Find $\displaystyle\int \frac{1}{\sqrt{4 - x^2}} dx$