Calculus I

Final Test

考試注意事項：

1. 答案紙直行對折，兩直攔書寫作答。

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 the area of the region bounded by the graph of $x = y^2$ and $y = x - 2$.

2. (15%) Derive the derivative of $y = \sin^{-1} x$, where $\sin^{-1} x$ is the inverse function of $\sin x$.

3. (15%) Find the derivative of $f(x) = x^x$.

4. (15%) Evaluate $\displaystyle \lim_{x \to 0^+} \left(\frac{1}{x} \right)^{\sin x}$.

5. (10%) Find the volume of the solid obtained by revolving the region bounded $y = \sqrt{x}$ and $y = x$ about the x-axis.

6. (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.

7. (10%) Evaluate $\displaystyle \int_0^1 \frac{e^x}{1 + e^x} \, dx$.

8. (10%) Find $\displaystyle \int \frac{e^x}{e^{2x} + 1} \, dx$.