1. Find the length of the curve \( y = \frac{2}{3}(x^2 - 1)^{3/2}, \ 1 \leq x \leq 3. \) (7分)

2. Use two methods (用兩種方法) to find the volume (體積) of the solid obtained by rotating (旋轉) the region bounded by the curves \( y = \sqrt{x} \) and \( y = x \) about the \( x \)-axis (x 軸). (14分)

3. Find the area (面積) of the region enclosed by the given curves (14分)
   \[(1) \ y = 4x \text{ and } y = x^3. \quad (2) \ x + y^2 = 3 \text{ and } 4x + y^2 = 0\]

4. Determine whether the series is convergent or divergent. (判斷収斂或發散) (沒有理由不給分) (15分)

\[
\begin{align*}
(1) & \sum_{n=1}^{\infty} \frac{5^n}{n^{1000}} \\
(2) & \sum_{n=1}^{\infty} \frac{1}{n^{0.7}} \\
(3) & \sum_{n=1}^{\infty} \frac{1}{n^{3}} \\
(4) & \sum_{n=1}^{\infty} 100 \left( \frac{-7}{5} \right)^n \\
(5) & \sum_{n=1}^{\infty} 7^n \cdot 3^{-2n}
\end{align*}
\]