

系所組別： 製造資訊與系統研究所丙組

考試科目： 微積分

考試日期： 0220， 節次： 3

※ 考生請注意：本試題 可 不可 使用計算機

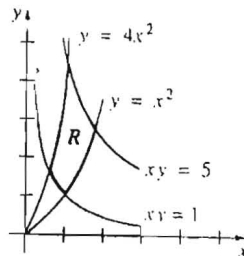
1. (20 pts, 10 pts each) Evaluate (a) $\int \frac{x^2}{x^3 + 5} dx$, and (b) $\int \frac{dx}{1 + e^{-2x}}$.

2. (20 pts) Find the vertices and foci of the following ellipse.

$$9x^2 - 36x + 25y^2 + 150y + 36 = 0$$

3. (20 pts,) Evaluate (a) $\int 8^x dx$, and (b) $\int \frac{2^{\sqrt{x}}}{\sqrt{x}} dx$.

4. (20 pts) Evaluate $\iint_R xy \, dA$ over the region R shown in the following figure.



5. (20 pts) When a ball is dropped from a height of s ft off the ground, it takes $t = \sqrt{2s/g}$ s to reach the ground. Suppose the ball always rebounds to a certain fixed fraction f of its prior height, where $0 < f < 1$. Let T be the time for the ball to come to rest. Find a formula for T .