淡江大學九十四學年度碩士班招生考試試題

系別：產業經濟學系　　　　　科目：微　積　分

請詳列過程！

1. (50%) Find the derivatives of:

   (a) $y = \ln x - \ln(1+x)$;

   (b) $y = 12^{1-x}$;

   (c) $y = e^{rx}$;

   (d) $y = x^2 \sin x$;

   (e) $g(x) = \int_0^x \sqrt{1+t^2}\, dt$.

2. (10%) Find $\dfrac{dy}{dx}$ if $x^3 + y^3 = 6xy$.

3. (20%) (a) Find the extremum of $z = x_1^2 + x_2^2$ subject to $x_1 + 4x_2 = 2$.

   (b) Find the maximum value of the function

   $f(x,y,z) = x + 2y + 3z$ on the curve of intersection of the

   plane $x - y + z = 1$ and the cylinder $x^2 + y^2 = 1$.

4. (20%) Let the demand and supply be

   $$Q_d = \alpha - \beta P - \eta \frac{dP}{dt} \qquad Q_s = \delta P \qquad (\alpha, \beta, \eta, \delta > 0)$$

   (a) Assuming that the market is cleared at every point of time, find the time path $P(t)$. (Show the general solution.)

   (b) Does this market have dynamically stable intertemporal equilibrium price? Explain.