國立臺灣海洋大學河海工程學系 2014 工程數學(一) 第四次作業參考解答

系級：_____ 學號：_____ 姓名：_____

試以全微分法求解下述各題

1. (1) $(x-y^3)dy = ydx$ (2) $1+x^2y^2+y+xy'=0$

2. (1) $(e^x \sin y + 3y)dx + (3x + e^x \cos y)dy = 0$
   (2) $(1+\cos\theta)dr = r\sin\theta\, d\theta$

3. (1) $2xydx + (1+x^2)dy = 0$
   (2) $y(1-xy+x^2y^2)dx + x(x^2y^2 - xy)dy = 0$

4. (1) $(2y + e^y + 6x^2)\dfrac{dy}{dx} + 4 + 12xy = 0$
   (2) $\dfrac{dy}{dx} = \dfrac{-xy^2 - y}{x}$

參考解答:

1. (1) $\dfrac{x}{y} + \dfrac{1}{2}y^2 = c$ (2) $x + \tan^{-1}(xy) = c$

2. (1) $e^x \sin y + 3xy = c$
   (2) $c \cdot r = \cos\theta - 1$

3. (1) $x^2y + y = c$
   (2) $\dfrac{1}{2}x^2y^2 - xy + \ln x = c$

4. (1) $y^2 + e^y + 6x^2y + 4x = c$
   (2) $\ln x - \dfrac{1}{xy} = c$