MATH073 Exam #2 Sumedh Guha

① $L=30 \quad w=24 \quad \text{error} = 0.1 = \Delta L = \Delta w$

$A = L \cdot w$

$\frac{dA}{dL} = w \qquad \frac{dA}{dw} = L$

$dA = \frac{dA}{dL}\Delta L + \frac{dA}{dw}\Delta w$

$dA = w\Delta L + L\Delta w = 24(0.1) + 30(0.1) = 2.4 + 3.0 = \boxed{5.4\,cm^2}$

② $f(x,y) = 1 + x\ln(xy-5) \quad (2,3)$ $\qquad f(2,3) = 1 + 2\ln(1) = 1$

$f_x(x,y) = \ln(xy-5) + \frac{xy}{xy-5} \qquad f_y(x,y) = \frac{x^2}{xy-5}$

$f_x(2,3) = 0 + \frac{6}{6-5} = 6 \qquad f_y(2,3) = \frac{4}{6-5} = 4$

$L_x(a,b) = f(a,b) + f_x(a,b)(x-a) + f_y(a,b)(y-b)$

$L_x(2,3) = 1 + 6(x-2) + 4(y-3) = 1 + 6x - 12 + 4y - 12 = 6x + 4y - 23$

$\boxed{L_x(2,3) = 6x + 4y - 23}$