EC1110: Intermediate Microeconomics

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Math Exercise

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1. Derivative:
   A. Take the first derivative of the following functions:
      a) $Y = a + bX$
      b) $Y = aX^b$
      c) $Y = a + bX + cX^2$
      d) $Y = lnX + \sqrt{X}$
      e) $Y = logX^2$

   B. Take the first and second derivatives of the following functions:
      a) $Y = a + bx + cx^2$
      b) $Y = logx$
      c) $Y = e^x x^2$

   C. Take all partial derivates of the following functions:
      a) $f(x, y, z) = xyz + x^2y + z^3$
      b) $f(x, y) = xy(x^2 + y^2)$
      c) $f(x, y) = xlogy$

2. Inverse Function: find the inverse function of the following functions. (if Y=f(X), then inverse function is X=f(Y).)
   a) $Y = 4 + 5x$
   b) $C = \frac{5}{9}(F - 32)$

3. Chain Rule:
   a) *y=f(z), z=g(x)* Use the chain rule to calculate $\frac{dy}{dx}$
   b) $P = (150 - 0.2q)^{0.5}$. Use the chain rule to calculate $\frac{dp}{dq}$

4. Cobb-Douglass Function: $x^\alpha y^\beta$ is generally called Cobb-Douglass functions.
   a) Compute the first and second partial derivatives.
   b) $3x + 2y = 6, x > 0, y > 0$. Then what is the maximum value of xy?
   c) $3x + 2y = 6, x > 0, y > 0$. What is the maximum value of $(1 - y)x$?