MATH 203 WORKSHEET #7

(1) Find the partial derivatives of the following functions.
(a) \( f(x, y) = x^2 + e^{7y} - 143 \)

(b) \( u = 2s + 5t + 8 \)

(c) \( f(x, y) = x^5 - 5x^3y + 3y^4 \)

(d) \( z = \frac{x}{y} \)

(e) \( z = x - y + 2xe^{y^2} \)

(f) \( r = 2^st + (s - 5t)^8 \)
(2) Find the tangent plane at the indicated point.
   (a) $z = 5x^2 + 3y + xy$ at $(x_0, y_0) = (1, 2)$

   (b) $z = x \ln y$ at $(x_0, y_0) = (4, 2)$

   (c) $z = x + \frac{x}{y + 1}$ at $(x_0, y_0) = (2, 1)$

(3) Find where these functions have a minimum. (In general, there are tests to determine whether a stationary point is a maximum, minimum or saddle point. For now, trust me, these are minima.)
   (a) $z = x^2 + y^2 - 5y$

   (b) $z = x^2 + x + y^2 - 4y$

   (c) $z = 2x^2 - 2xy + y^2 - 2x$

   (d) $z = x^2 - 4xy + 4y^2 - 11$