

1 | 0

- Done

2 | 1

First partial derivatives:  $\langle \frac{\partial f}{\partial x}, \frac{\partial f}{\partial y} \rangle = \langle 8xy^5 + 9x^2y^2, 20x^2y^4 + 6x^3y \rangle$  Second partial derivatives:  $\langle \frac{\partial^2 f}{\partial x^2}, \frac{\partial^2 f}{\partial x \partial y}, \frac{\partial^2 f}{\partial y^2} \rangle = \langle 8y^5 + 18xy^2, 40xy^4 + 18x^2y, 80x^2y^3 + 6x^3 \rangle$  Third partial derivatives:  $\langle \frac{\partial^3 f}{\partial x^3}, \frac{\partial^3 f}{\partial x^2 y}, \frac{\partial^3 f}{\partial x y^2}, \frac{\partial^3 f}{\partial y^3} \rangle = \langle 18y^2, 40y^4 + 36xy, 160xy^3 + 18x^2, 240x^2y^2 \rangle$

3 | 2

3.1 | (a)