Worksheet 1

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1. Let $f(x, y) = xy$. Show that $f(2 + h, 3) - f(2, 3) = 3h$.

2. Let $f(x, y) = xy$. Show that $f(2, 3 + k) - f(2, 3) = 2k$.

3. Let $f(x, y) = 10x^{2/5}y^{3/5}$. Show that $f(3a, 3b) = 3f(a, b)$.

(4-8) Find $\dfrac{\partial f}{\partial x}$ and $\dfrac{\partial f}{\partial y}$ for each of the following functions.

4. $f(x, y) = 2x^2 e^y$.

5. $f(x, y) = xe^{xy}$.

6. $f(x, y) = \dfrac{e^x}{1 + e^y}$.

7. $f(x, y) = x^2 e^{3x} \ln(y)$.

8. $f(x, y) = \sqrt{x^2 + y^2}$.

(9-12) Find $\dfrac{\partial^2 f}{\partial x^2}, \dfrac{\partial^2 f}{\partial y^2}, \dfrac{\partial^2 f}{\partial y \partial x}$ and $\dfrac{\partial^2 f}{\partial x \partial y}$ for each of the following functions.

9. $f(x, y) = xe^y + x^4 y + y^3$.

10. $f(x, y) = (x + y^2)^3$.

11. $f(x, y) = e^{x/y}$.

12. $f(x, y) = 60x^{3/4}y^{1/4}$.