Math 252 Exam 2 Review (Problems)

1. Describe the domain of

   $$f(x,y) = \frac{\ln(x-y)}{\sqrt{xy}}$$

2. Find an equation of the level surface of

   $f(x,y,z) = xy\sin z + 3xy^2e^z$ at $P(1,2,0)$

3. Determine if the following limit exists; if it does also state the value of the limit:

   $$\lim_{(x,y)\to(2,1)} \frac{x^2 - xy - 2y^2}{x^2 - 4y^2}$$

4. For $f(x,y) = 3x^4y^2 - x\cos y + 4x^3y^3$, find f_x, f_y, f_{xx} and f_{xy}.

5. For $f(x,y,z) = 4x^z + z^3\sin y$ find $\dfrac{\delta^3 f}{\delta x \delta y^2}$.

6. Use partial derivatives to find $\dfrac{dy}{dx}$ if $4x^2y + 2y^3 = 5x^3y^4$.

Math 252 Exam 2 Review (Answers)

1. $\{(x, y) : x > y, xy > 0\}$
2. $xy \sin z + 3xy^2 e^z$
3. $\frac{3}{4}$
4. $$\begin{aligned} f_x &= 12x^3y^2 - \cos y + 12x^2y^3 \\ f_y &= 6x^4y + x \sin y + 12x^3y^2 \\ f_{xx} &= 36x^2y^2 + 24xy^3 \\ f_{yy} &= 6x^4 + x \cos y + 24x^3y \\ f_{xy} &= 24x^3y + \sin y + 36x^2y^2 \end{aligned}$$
5. $\dfrac{\delta^3 f}{\delta x \delta y^2} = 0$
6. $\dfrac{dy}{dx} = \dfrac{15x^2y^4 - 8xy}{20x^3y^3 - 4x^2 + 6y^2}$