Worksheet on Partials and Anti-derivatives

1. If $f(x,y) = x^2 + (y-x)^2$, find:

   f_x and $\dfrac{\partial f}{\partial y}$ and ∇f and $D_u(f)$, where $u = <\dfrac{3}{5}, -\dfrac{4}{5}>$

2. $\dfrac{\partial}{\partial x}\dfrac{x}{1-xy^2}$ and $\dfrac{\partial}{\partial y}\dfrac{x}{1-xy^2}$

3. First partials with respect to x and y of $f(x,y) = \sqrt{2x+y^2}$

4. All second-order partials of $f(x,y) = x^2 e^{-yx}$

5. $\int 12x^2y^3\,dx$ and $\int 12x^2y^3\,dy$ and $\int_0^5 12x^2y^3\,dx$ and $\int_0^1 12x^2y^3\,dy$

6. $\int_0^2 \int_0^{\pi/2} x\sin(y)\,dy\,dx$

7. $\int_1^4 \int_1^2 \left(\dfrac{x}{y}+\dfrac{y}{x}\right)dy\,dx$

8. $\int_0^4 \int_0^{\sqrt{y}} x\,y^2\,dx\,dy$

9. $\int_0^1 \int_{x^2}^{x}(1+2y)\,dy\,dx$

10. $\int_0^2 \int_y^{2y} xy\,dx\,dy$

11. $\iint_D y^2\,dA$, where $D = \{(x,y): -1 \le y \le 1, -y-2 \le x \le y\}$

12. $\iint_D x\sqrt{y^2-x^2}\,dA$, where $D = \{(x,y): 0 \le y \le 1, 0 \le x \le y\}$

13. $\iint_D \dfrac{y}{x^5+1}\,dA$, where $D = \{(x,y): 0 \le x \le 1, 0 \le y \le x^2\}$