MAT257 PSET 4—Question 3

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(a) Note that the integral of g_1 does not depend on the second variable y. Therefore, applying the single variable fundamental theorem of calculus on $D_2 f(x,y) = \partial_y \int_0^y g_2(x,t)\mathrm{d}t = g_2(x,y)$

(b) Currently, $D_1 f(x,y) = g_1(x,0)$ by the single variable fundamental theorem of calculus. Changing f so that

$$f(x,y) = \int_0^x g_1(t,y)\mathrm{d}t + \int_0^y g_2(x,t)\mathrm{d}t$$

will change $D_1 f(x,y)$ to $g_1(x,y)$.

(c) $f_d(x,y) = \dfrac{x^2+y^2}{2}$

(d) $f_c(x,y) = xy$