Q-5

Thursday, May 27, 2021 5:13 PM

MATH 120 2020-2 Friday 10:40 - 12:30 - Quiz 5

Duration: ~ 20 min.

- Write your NAME, SURNAME, ID and SECTION.
- Upload your solutions to Gradescope as a SINGLE JPG or PDF PAGE.

Ouestion:

1. You are given that

$$I = \int_{\frac{1}{\sqrt{2}}}^{1} \int_{0}^{\arccos y} f(x,y)\,dx\,dy + \int_{0}^{\frac{1}{\sqrt{2}}} \int_{0}^{\arcsin y} f(x,y)\,dx\,dy = \iint_D f(x,y)\,dA.$$

(a) Sketch the region D **in detail**.

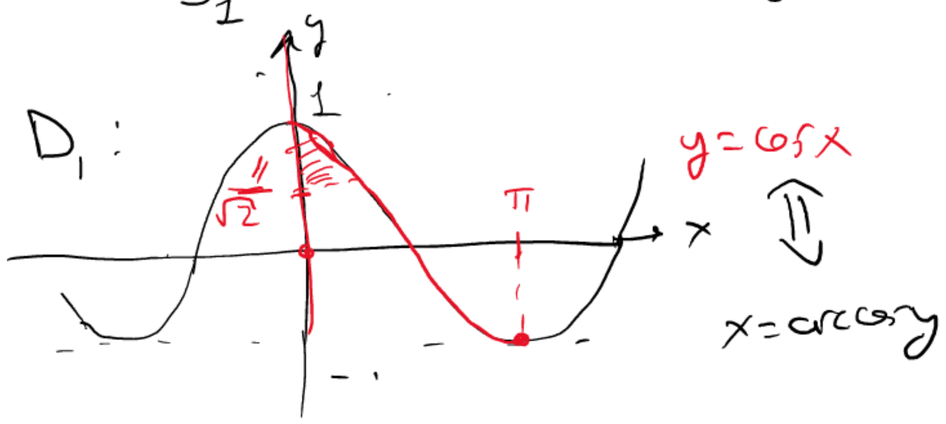
(b) Write $\iint_D f(x,y)\,dA$ as a single iterated integral in the order $dydx$.

a) $x = \arccos y \Rightarrow y = \cos x$ for $x \in [0, \pi]$

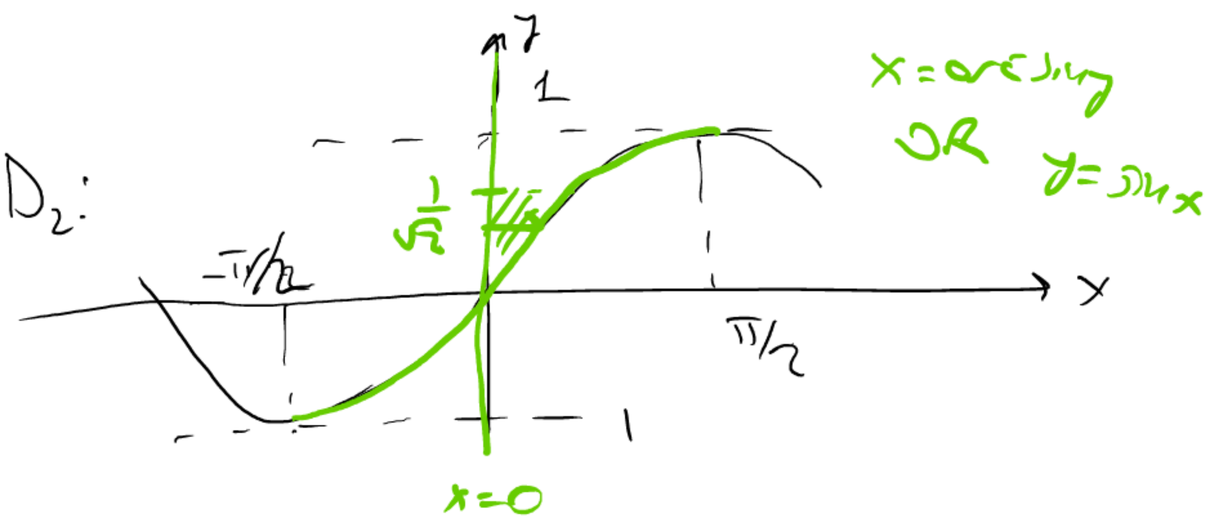
$x = \arcsin y \Rightarrow y = \sin x$ for $x \in [-\pi/2, \pi/2]$

$$I = \iint_{D_1} f(x,y)\,dA + \iint_{D_2} f(x,y)\,dA \quad \text{where}$$

D_1:

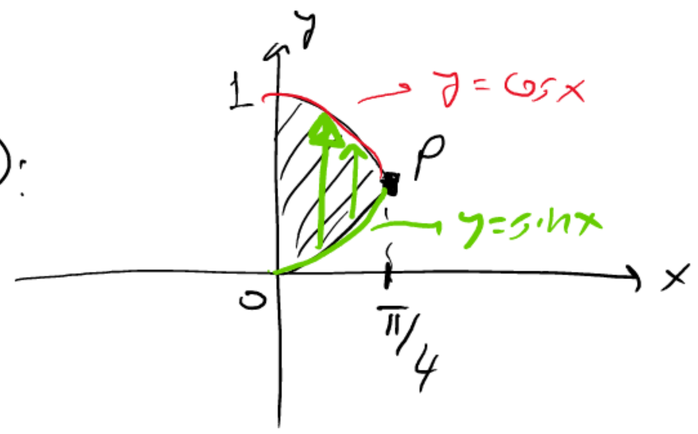


& D_2:



As D_1 & D_2 are disjoint (i.e. $\text{Area}(D_1 \cap D_2) = 0$),

$$I = \iint_D f(x,y)\,dA \quad \text{where} \quad D = D_1 \cup D_2 \quad \text{i.e} \quad D:$$



At $x = \frac{\pi}{4}$, $y = \cos x$ & $y = \sin x$ intersect.

OR

$x = \arccos y$

OR

$x = \arcsin y$

b) $$\iint_D f(x,y)\,dA = \int_0^{\pi/4} \int_{\sin x}^{\cos x} f(x,y)\,dy\,dx$$

$y = \sin x$

$y = \cos x$