1

$f(x,y) = \cos(2x+y)$
$D = \{\frac{1}{2} \le x \le \frac{\pi}{2}, 1 \le y \le 2x\}$

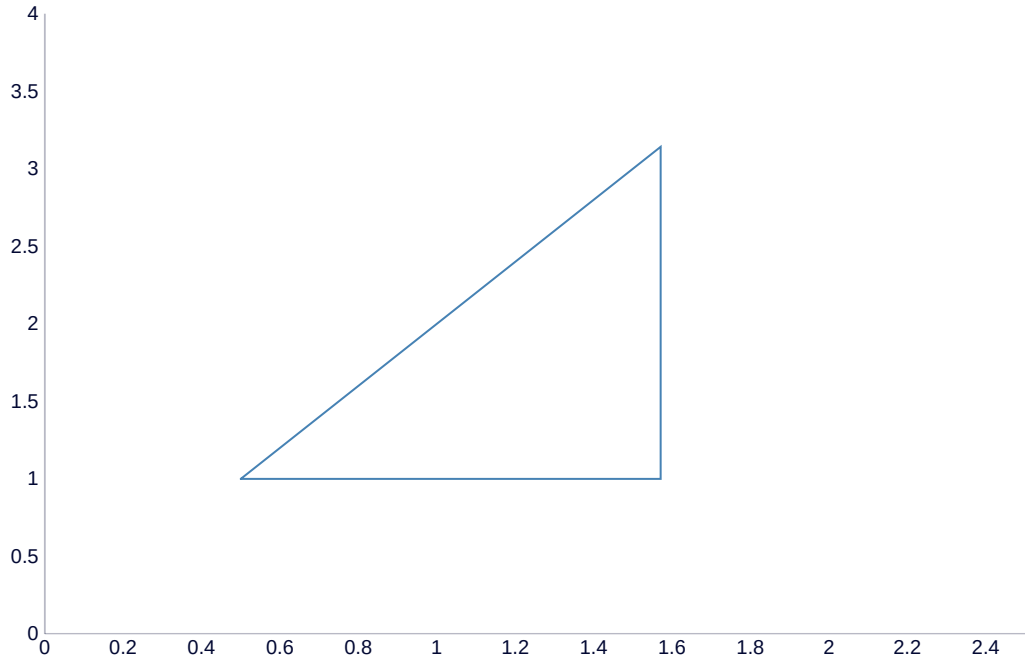
a

$$a = \iint_D f(x,y)dA = \iint_D \cos(2x+y)dA$$
$$= \int_{1/2}^{\pi/2} \int_{1}^{2x} \cos(2x+y)dy\,dx$$

b

$$\int_{1/2}^{\pi/2} \int_{1}^{2x} \cos(2x+y)dy\,dx = \int_{1/2}^{\pi/2} \sin(2x+y)\Big|_{y=1}^{2x} dx$$
$$= \int_{1/2}^{\pi/2} \sin(4x) - \sin(2x+1)dx$$
$$= \cos(2x+1)/2 - \cos(4x)/4\Big|_{1/2}^{\pi/2}$$
$$= \cos(\pi+1)/2 - \cos(2\pi)/4 + \cos(2)/2 - \cos(2)/2$$
$$= \cos(\pi+1)/2 - \cos(2\pi)/4$$
$$\approx -0.520$$

c



Slanted: $y = 2x$

Bottom: $y = 1$

Right: $x = \pi/2$

2

$$a = \int_{1}^{\pi} \int_{y/2}^{1} \cos(2x + y) dx \, dy$$

3

$$r = \sqrt{x^2 + y^2}$$
$$\theta = \arctan(\frac{y}{x})$$
$$x = r\cos\theta$$
$$y = r\sin\theta$$

$$y = 1 \iff r\sin\theta = 1 \iff r = 1/\sin\theta$$
$$x = \pi/2 \iff r\cos\theta = \pi/2 \iff r = \pi/2\cos\theta$$

$$a = \int_{\arctan(2/\pi)}^{\arctan 2} \int_{1/\sin\theta}^{\pi/2\cos\theta} \cos(2r\cos\theta + r\sin\theta) dr \, d\theta$$

□