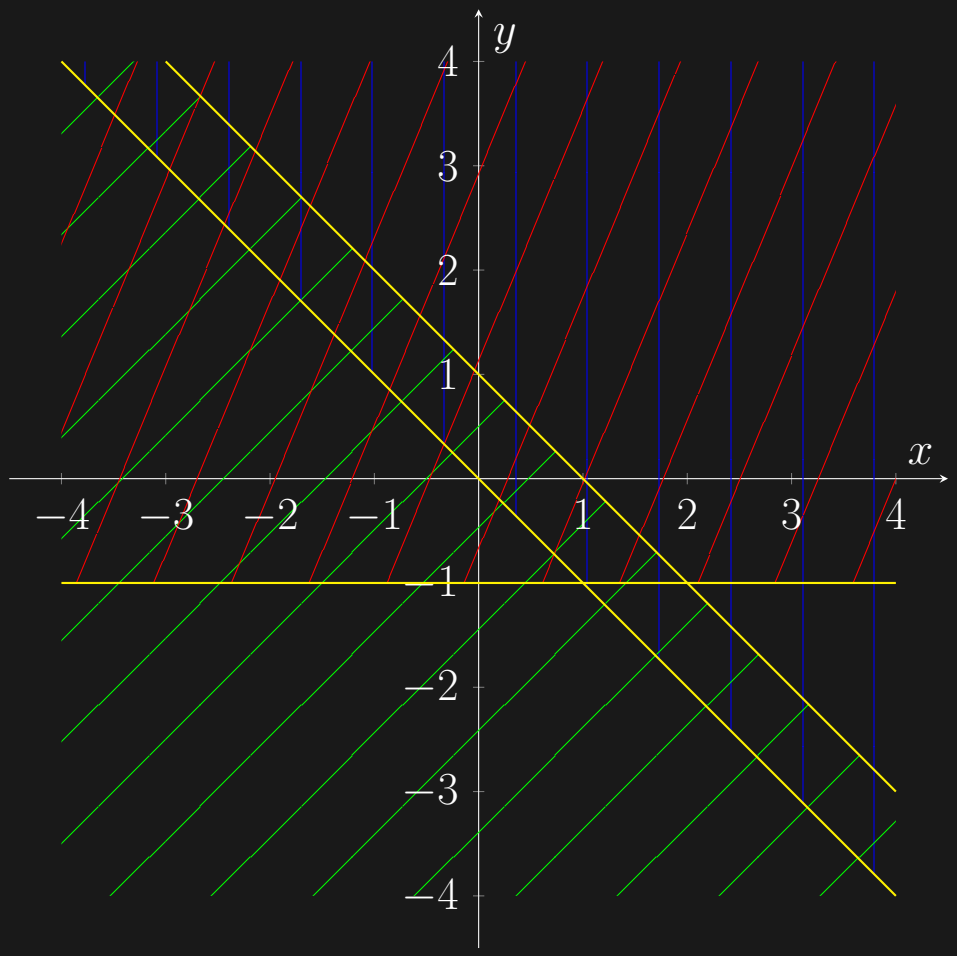
$$\iint_D \sqrt{x+y}\,dx\,dy \quad D=\{(x,y)\in\mathbb{R}^2 \mid 0\le x+y\le 1,\ y\ge -1\}$$

$$\begin{cases} 0\le x+y \\ x+y\le 1 \\ y\ge -1 \end{cases} \Leftrightarrow \begin{cases} -y\le x \\ x\le 1-y \\ y\ge -1 \end{cases} \Leftrightarrow \begin{cases} -y\le x\le 1-y \\ y\ge -1 \end{cases}$$



$$\int_{-1}^{\infty}\int_{-y}^{1-y} \sqrt{x+y}\,dx\,dy = \int_{-1}^{\infty}\int_{-y}^{1-y} \sqrt{x+y}(x+y)'\,dx\,dy =$$

$$= \int_{-1}^{\infty} \frac{(x+y)^{\frac{3}{2}}}{\frac{3}{2}}\Big|_{-y}^{1-y} dy = \int_{-1}^{\infty} \frac{2}{3} - \frac{0}{3}\,dy = \frac{2}{3}y\Big|_{-1}^{\infty} = \infty$$

$$\iint_D x\,dx\,dy \quad D=\{(x,y)\in\mathbb{R}^2 \mid x\geq y^2-3, x\leq 9+y, x\leq 9-y\}$$

$$\begin{cases} x\geq y^2-3 \\ x\leq 9+y \\ x\leq 9-y \end{cases} \Leftrightarrow \begin{cases} y^2-3\leq x\leq 9-y \\ y^2-3\leq x\leq 9+y \end{cases} \Leftrightarrow \begin{cases} y^2-3\leq 9-y \\ y^2-3\leq 9+y \end{cases} \Leftrightarrow$$

$$\Leftrightarrow \begin{cases} y^2-3+y-9\leq 0 \\ y^2-3-y-9\leq 0 \end{cases} \Rightarrow \begin{cases} y^2+y-12=0 \\ y^2-y-12=0 \end{cases}$$

$y^2-y-12=0$
$\delta=(-1)^2-4*1*(-12)=1+48=49=7^2$
$\frac{-(-1)\pm\sqrt{\delta}}{2*1}=\frac{1\pm 7}{2}=\begin{cases}\frac{1-7}{2}=\frac{-6}{2}=-3\\ \frac{1+7}{2}=\frac{8}{2}=4\end{cases}$

y		-3		4	
y^3-y-12	$++++$	0	$----$	0	$++++$

$\Rightarrow y\in[-3,4]$

$y^3+\underbrace{y}_{4y-3y}-12=0$

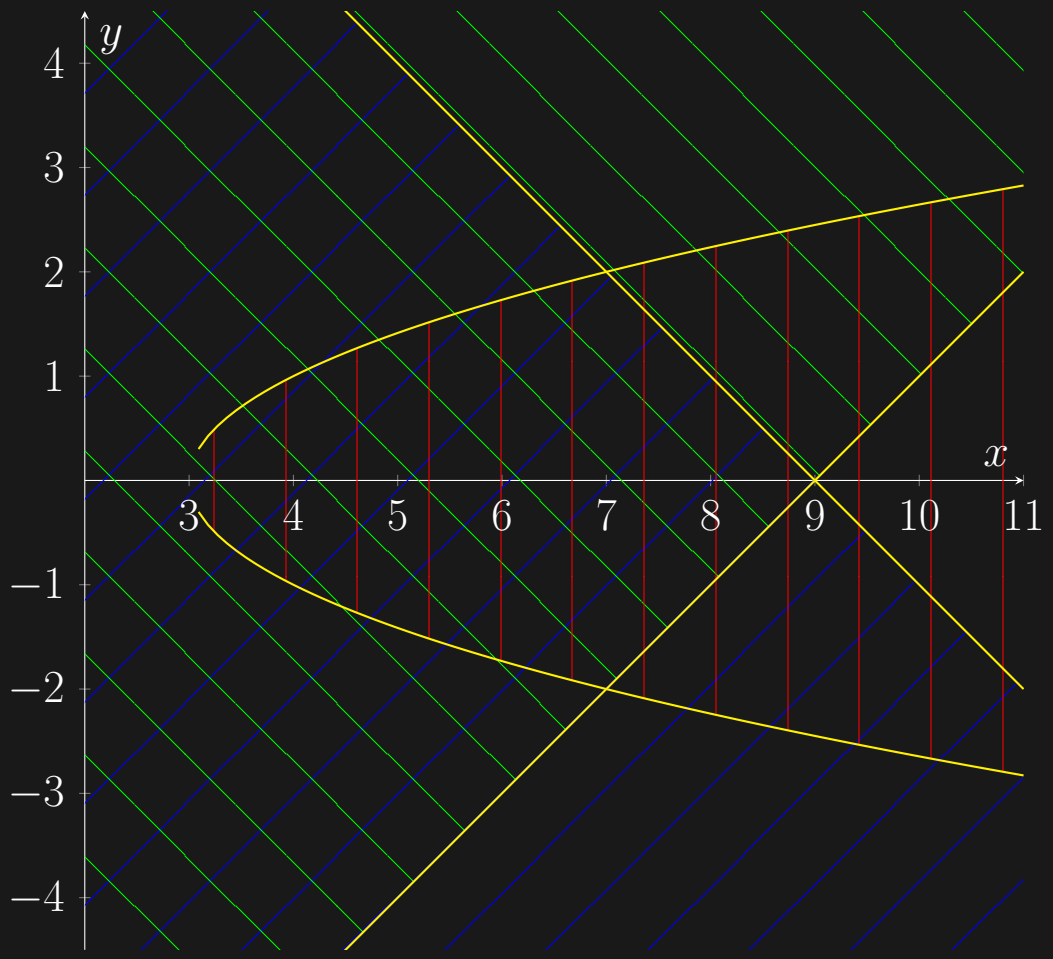
y		-4		3	
y^3+y-12	$++++$	0	$----$	0	$++++$

$\Rightarrow y\in[-4,3]$
$\Rightarrow y\in[-3,3]$

$y^2-3\leq x\leq min(9-y,9+y)$
$g:[-3,3]\to\mathbb{R}, g(y)=min(9-y,9+y)$

$9-y\leq 9+y\Leftrightarrow 0\leq y\Rightarrow y\in[0,3]$
$9-y\geq 9+y\Leftrightarrow 0\geq y\Rightarrow y\in[-3,0]$

$$D=\begin{cases} y^2-3\leq x\leq 9+y, -3\leq y\leq 0 \\ y^2-3\leq x\leq 9-y, 0\leq y\leq 3 \end{cases}$$


y
x
4
3
2
1
−1
−2
−3
−4
3
4
5
6
7
8
9
10
11

$$\int_{-3}^{0}\int_{y^2-3}^{9+y} x\,dx\,dy + \int_{0}^{3}\int_{y^2-3}^{9-y} x\,dx\,dy = \int_{-3}^{0} \frac{x^2}{2}\Big|_{y^2-3}^{9+y}\,dy +$$

$$+\int_{0}^{3} \frac{x^2}{2}\Big|_{y^2-3}^{9-y}\,dy = \frac{1}{2}\int_{-3}^{0} (y^2-3)^2 - (9+y)^2\;dy +$$

$$+\tfrac{1}{2}\int_{0}^{3} (y^2-3)^2 - (9-y)^2\,dy = \frac{1}{2}\int_{-3}^{0} y^4 - 6y^2 + 9 - 81 - 18y - y^2\,dy +$$

$$+\tfrac{1}{2}\int_{0}^{3} y^4 - 6y^2 + 9 - 81 + 18y - y^2\,dy = \frac{1}{2}\int_{-3}^{0} y^4 - 7y^2 - 18y - 72\;dy +$$

$$+\tfrac{1}{2}\int_{0}^{3} y^4 - 5y^2 - 18y - 72\,dy = \frac{1}{2}\left(\frac{y^5}{5} - 7\frac{y^3}{3} - 18\frac{y^2}{2} - 72y\right)\Big|_{-3}^{0} +$$

$$+\tfrac{1}{2}\left(\tfrac{y^5}{5} - 5\tfrac{y^3}{3} - 18\tfrac{y^2}{2} - 72y\right)\Big|_{0}^{3} = -\tfrac{1}{2}\left(\tfrac{(-3)^5}{5} - 7\tfrac{(-3)^3}{3} - 9(-3)^2 - 72(-3)\right) +$$

$$+\tfrac{1}{2}\left(\tfrac{3^5}{5} - 5\tfrac{3^3}{3} - 9*3^2 - 72*3\right) = \tfrac{\frac{3^5}{5} - 7*3^2 + 3^4 - 216 + \frac{3^5}{5} - 5\frac{3^3}{3} - 3^4 - 216}{2} =$$

$$= \tfrac{2\frac{3^5}{5} - 12*3^2 - 432}{2} = \tfrac{3^5}{5} - 2*3^3 - 8*3^3 = \tfrac{3^5}{5} - 10*3^3$$

WIP