15.3, number 17: **Compute**

$$\int_{-1}^{0}\int_{-2x}^{1-x} dy\,dx + \int_{0}^{2}\int_{-x/2}^{1-x} dy\,dx.$$

This sum of integrals gives the area of a region. Draw the region.

Answer: We drew the region on the next two pages. We compute

$$\begin{aligned}
&\int_{-1}^{0}\int_{-2x}^{1-x} dy\,dx + \int_{0}^{2}\int_{-x/2}^{1-x} dy\,dx \\
=\ & \int_{-1}^{0} y\Big|_{-2x}^{1-x} dx + \int_{0}^{2} y\Big|_{-x/2}^{1-x} dx \\
=\ & \textstyle\int_{-1}^{0} 1 - x - (-2x)\,dx + \int_{0}^{2}(1-x) - (-x/2)\,dx \\
=\ & \textstyle\int_{-1}^{0}(1+x)\,dx + \int_{0}^{2}(1-\frac{x}{2})\,dx \\
=\ & (x+\tfrac{x^2}{2})\Big|_{-1}^{0} + (x-\tfrac{x^2}{4})\Big|_{0}^{2} \\
=\ & -(-1+\tfrac{1}{2}) + (2-\tfrac{4}{4}) \\
=\ & \boxed{\tfrac{3}{2}}
\end{aligned}$$

Picture 15.3 Number 17

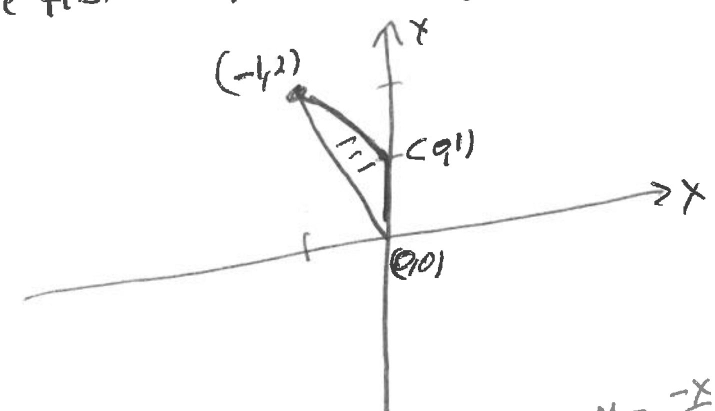
$$\int_{-1}^{0}\int_{-2x}^{1-x} dy\,dx + \int_{0}^{2}\int_{-\frac{x}{2}}^{1-x} dy\,dx$$ gives the area of which region

For the first integral we draw $y=-2x$ and $y=1-x$ for $-1\le x\le 0$

$y=-2x$ is the line segment from $(-1,2)$ to $(0,0)$

$y=1-x$ is the line segment from $(-1,2)$ to $(0,1)$

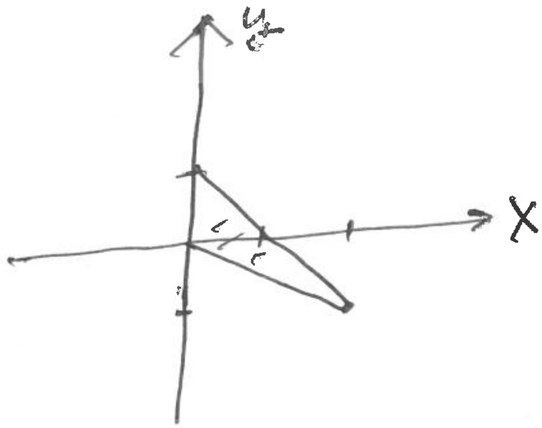
The first integral computes the area of



For the second integral we draw $y=\frac{-x}{2}$ and $y=1-x$ for $0\le x\le 2$

$y=\frac{-x}{2}$ is the line segment from $(0,0)$ to $(2,-1)$

$y=1-x$ is the line segment from $(0,1)$ to $(2,-1)$



The integrals of Number 17 in 15.3 find the area of the following triangle