Quiz 4: (5.6) Area of Regions Defined By Curves
(Integrating with respect to y)

Find the total area of the shaded region.

Points of intersection:

\[-y^2 = 3 - 4y^2\]
\[3y^2 = 3\]
\[y^2 = 1\]
\[y = \pm 1\]
\[\rightarrow (-1, 1)\]
\[\rightarrow (-1, -1)\]

Total area:

\[
\int_0^1 (3 - 4y^2) - (-y^2) \, dy
\]

Span of \(y\) 2

\[
= \int_{-1}^1 3 - 3y^2 \, dy
\]

\[
= \left[ 3y - \frac{3y^3}{3} \right]_{-1}^1
\]

\[
= 3(-1) - \frac{3(-1)^3}{3} - \left( 3\cdot1 - \frac{3\cdot1^3}{3} \right)
\]

\[
= -3 + 1 - 2
\]

\[
= 4
\]