6. [11 points] Louise, a world-famous abstract artist and cheese enthusiast, is experimenting with new designs for cheese sculptures. She has two ideas for a cheese sculpture and would like to know the volume of each one so that she knows how much cheese to buy.

a. [6 points] Louise’s first idea involves the shaded region to the right, which is bounded by the line \( x = 1 \) and the curves

\[
a(x) = 2 + \sin \left( \frac{\pi}{2} x \right) \quad \text{and} \quad b(x) = x^4
\]
on the interval \([-1, 1]\).

Write an integral that represents the volume of the solid formed by rotating this region around the line \( x = 2 \).

**Do not evaluate your integral.** Your answer should not involve the letters \( a \) or \( b \).

Answer:

b. [5 points] Louise’s second idea involves the shaded region to the right, bounded by the curve

\[
c(x) = (\sqrt{3})^{2-x},
\]
the \( y \)-axis, and the line \( y = 1 \) on the interval \([0, 2]\).

Write an integral that represents the volume of the solid formed by rotating this region around the \( x \)-axis.

**Do not evaluate your integral.** Your answer should not involve the letter \( c \).

Answer: