Exercise 1: Derive the formula for a ball of radius \( R \)’s volume, using disks. (This was Exercise 5 Monday.)

\[
x^2 + y^2 = R^2
\]

Exercise 2: A solid ball of radius \( R \) is "peeled" along perpendicular great circles, creating an object with square cross-sections (perpendicular to the axis through the pts of intersection of the great circles). Find the volume!
Exercise 3: The region bounded by the graph \( y = -x^2 + 2x = -(x-1)^2 + 1 \) and the x-axis is rotated about the line \( x = -1 \).

3a) Set up the integral for the volume of the resulting solid, using planar slabs (washers):

\[
\Delta V = \int \pi (r_2^2 - r_1^2) \, h \, \Delta r
\]

\[
V = \pi \left( \frac{r_2^3 - r_1^3}{3} \right) h
\]

3b) There's an easier way to do this problem, using cylindrical shells.

Think of cutting & unrolling:

\[
\Delta V = 2 \pi r h \, \Delta r
\]

\[
V = 2 \pi r h \int \Delta r
\]
\[ 3a) \quad \pi \int_0^1 (2 + \sqrt{1 - y})^2 - (2 - \sqrt{1 - y})^2 \, dy \]
\[ > \text{Pi*Int}((2+\sqrt{1-y})^2-(2-\sqrt{1-y})^2,y=0..1); \]
\[ > \text{Pi*Int}((2+\sqrt{1-y})^2-(2-\sqrt{1-y})^2,y=0..1); \]
\[ \frac{16 \pi}{3} \]

\[ 3b) \quad 2\pi \int_0^2 (-x^2 + 2x + 1) \, dx \]
\[ > 2\text{Pi*Int}((-x^2+2x+1),(x+1),x=0..2); \]
\[ > 2\text{Pi*Int}((-x^2+2x+1),(x+1),x=0..2); \]
\[ \frac{16 \pi}{3} \]
\[ > \text{evalf}(\%); \]
\[ 16.75516082 \]

**Exercise 4**
Rework the volume of a radius R ball, using cylindrical shells.