For each problem, find the volume of the solid that results when the region enclosed by the curves is revolved about the the given axis. You may use the provided graph to sketch the curves and shade the enclosed region.

1) \( y = 2\sqrt{\cos x}, \ y = \sqrt{\cos x}, \ x = 0, \ x = \frac{\pi}{2} \)  
Axis: \( y = 0 \)

\[
\pi \int_{0}^{\frac{\pi}{2}} \left( (2\sqrt{\cos x})^2 - (\sqrt{\cos x})^2 \right) \, dx
\]
\[
= 3\pi \approx 9.425
\]

2) \( y = x^2 + 1, \ y = 0, \ x = -2, \ x = 0 \)  
Axis: \( y = 0 \)

\[
\pi \int_{-2}^{0} (x^2 + 1)^2 \, dx
\]
\[
= \frac{206}{15}\pi \approx 43.145
\]

3) \( x = y^2 + 3, \ x = 1, \ y = 1, \ y = 2 \)  
Axis: \( x = 1 \)

\[
\pi \int_{1}^{2} (y^2 + 2)^2 \, dy
\]
\[
= \frac{293}{15}\pi \approx 61.366
\]

4) \( x = -y^2 + 7, \ x = -y + 5, \ y = 0, \ y = 2 \)  
Axis: \( x = 0 \)

\[
\pi \int_{0}^{2} \left( (-y^2 + 7)^2 - (-y + 5)^2 \right) \, dy
\]
\[
= \frac{172}{5}\pi \approx 108.071
\]
For each problem, use the shell method to find the volume of the solid that results when the region enclosed by the curves is revolved about the given axis. You may use the provided graph to sketch the curves and shade the enclosed region.

5) \( y = 2\sqrt{x}, \ y = 0, \ x = 1, \ x = 4 \)
   Axis: \( x = 0 \)

\[
2\pi \int_{1}^{4} x \cdot 2\sqrt{x} \, dx
\]
\[
= \frac{248}{5}\pi
\]

6) \( x = -y^2 + 5, \ x = 1, \ y = 0, \ y = 2 \)
   Axis: \( y = -3 \)

\[
2\pi \int_{0}^{2} (y + 3)(-y^2 + 5 - 1) \, dy
\]
\[
= 40\pi
\]

7) \( x = \sqrt{y} + 2, \ x = 2, \ y = 4 \)
   Axis: \( y = 0 \)

\[
2\pi \int_{0}^{4} y(\sqrt{y} + 2 - 2) \, dy
\]
\[
= \frac{128}{5}\pi
\]

8) \( y = 2\sqrt{x}, \ y = 0, \ x = 1, \ x = 4 \)
   Axis: \( x = 4 \)

\[
2\pi \int_{1}^{4} (4 - x) \cdot 2\sqrt{x} \, dx
\]
\[
= \frac{376}{15}\pi
\]