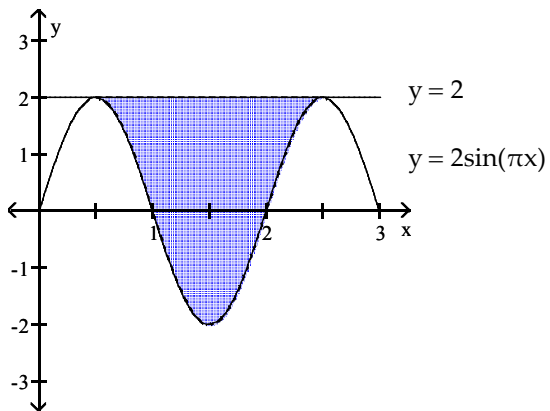


Please read the directions carefully. Some problems may have more than one part. Show all of your work or justify your solutions to receive full credit. Un-justified answers will not receive full credit.

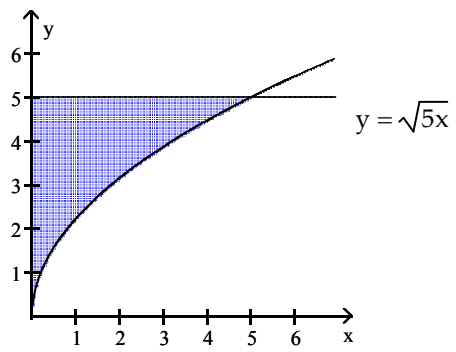
Find the area of the shaded region.

1)



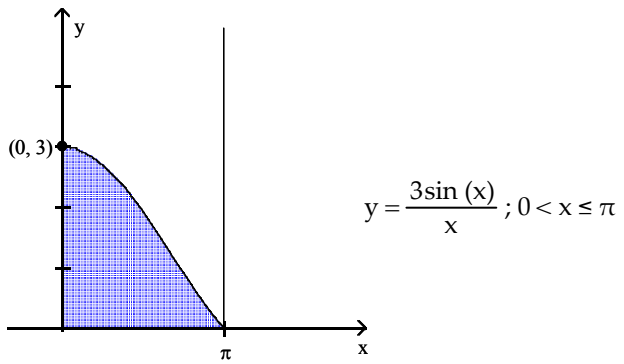
Find the volume of the solid generated by revolving the shaded region about the given axis.

2) About the y-axis



Use the shell method to find the volume of the solid generated by revolving the shaded region about the indicated axis.

3) About the y-axis



**Solve the problem.**

- 4) A vertical right circular cylindrical tank measures 7 meters high and 3 meters in diameter. It is full of oil with a density of  $840 \text{ kg/m}^3$ . How much work does it take to pump the oil to a level 2 meters above the top of the tank? Give your answer to the nearest whole joule.

**Find the length of the curve.**

- 5)  $y = 3x^{3/2}$  from  $x = 0$  to  $x = 4$

**Solve the problem.**

- 6) A force of 100 N stretches a spring by 0.5 meters. How much work is done in stretching the spring from 1 meter to 2 meters beyond its natural length?