More problems for section 6.2 of *Calculus, Early Transcendentals* by James Stewart, 8e.

1. The intersection of a 3-dimensional solid with the xy-plane is a region R, and ℓ is a line in the plane. Find the volume of the solid if R is the region bounded by {the given curves}, ℓ is [the given line], and the solid's cross-sections perpendicular to ℓ are as described.

a. $\{y = \sqrt{16 - x^2}$, y=0$\}$, [the x-axis], squares with one side in R.
b. $\{y = \sqrt{16 - x^2}$, y=0$\}$, [the x-axis], squares with one diagonal in R.
c. $\{y = \sqrt{16 - x^2}$, y=0$\}$, [the y-axis], squares with one side in R.
d. $\{y = 2\sqrt{x},\ x = 0,\ y = 2\}$, [the x-axis], squares with one side in R.
e. $\{y = 2\sqrt{x},\ x = 4,\ y = 0\}$, [the x-axis], equilateral triangles with one side in R.
f. $\{y = 2\sqrt{x},\ x = 4,\ y = 0\}$, [the y-axis], squares with one side in R.
g. $\{y = x,\ y = x^3, \}$, [the y-axis], squares with one side in R.
h. $\{y = x,\ y = x^3, \}$, [the x-axis], squares with one side in R.
i. $\{y = x,\ y = x^3, \}$, [the x-axis], circles with a diameter in R.
j. $\{y = x,\ y = x^3, \}$, [the x-axis], equilateral triangles with one side in R.
k. $\{y = \frac{1}{4}x^2,\ y = 5 - x^2, \}$, [the x-axis], squares with one side in R.
l. $\{y = \frac{1}{4}x^2,\ y = 0,\ x = 2, \}$, [the x-axis], squares with one side in R.
m. $\{y = \frac{1}{4}x^2,\ y = 0,\ x = 2, \}$, [the y-axis], squares with one side in R.
n. $\{y = \frac{1}{4}x^2,\ y = 0,\ x = 2, \}$, [the y-axis], circles with a diameter in R.
o. $\{xy = 1,\ y = 1,\ y = 2,\ x = 0, \}$, [the y-axis], squares with one side in R.
p. $\{xy = 1,\ y = 1,\ y = 2,\ x = 0, \}$, [the y-axis], circles with a diameter in R.
q. $\{xy = 1,\ y = 1,\ y = 2,\ x = 0, \}$, [the y-axis], equilateral triangles with one side in R.
r. $\{y = 2,\ x = 0,\ y = e^x\}$, [the x-axis], squares with one side in R.
s. $\{y = 2,\ x = 0,\ y = e^x\}$, [the y-axis], squares with one side in R.
t. $\{y = \sin x,\ y = 0,\ x = 0,\ x = \pi\}$, [the x-axis], squares with one side in R.
u. $\{y = \sin x,\ y = \cos x,\ x = \pi/4,\ x = 5\pi/4\}$, [the x-axis], squares with one side in R.
v. $\{y = e^x,\ y = -x,\ x = 0,\ x = 2\}$, [the x-axis], squares with one side in R.
w. $\{y = e^x,\ y = e^{-x},\ x = 1\}$, [the x-axis], squares with one side in R.

Answers

1a. $2^8/3$ (or 256/3) 1b. $2^7/3$ (or 128/3) 1c. $2^9/3$ (or 512/3) 1d. 2/3 1e. $8\sqrt{3}$ 1f. 512/15 1g. 16/105 1h. 16/105
1i. $16\pi/420$ 1j. $16\sqrt{3}/420$ 1k. 160/3 1l. 2/5 1m. 2/3 1n. $2\pi/12$ 1o. 1/2 1p. $\frac{\pi}{8}$ 1q. $\frac{\sqrt{3}}{8}$ 1r. $\ln 16 - 5/2$ 1s. $2(1 - \ln 2)^2$
1t. $\pi/2$ 1u. π 1v. $\frac{25}{6} + 2e^2 + \frac{e^4}{4}$ 1w. $\sinh 2 - 2$