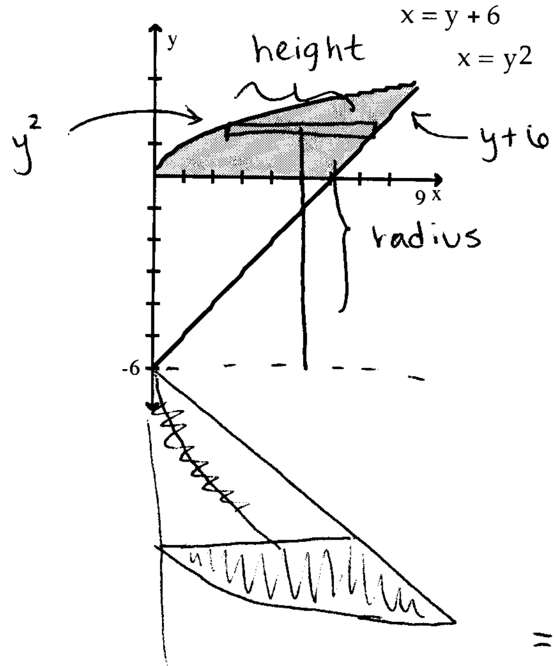
Use the shell method to find the volume of the solid generated by revolving the shaded region about the indicated line.

2) About the line y = - 6



radius of shell = $y+6$

height of shell = $y+6-y^2$

$$\text{volume} = \int_0^3 2\pi(\text{rad})(\text{ht})\,dy$$

$$= \int_0^3 2\pi(y+6)(y+6-y^2)\,dy$$

$$= -2\pi\int_0^3 y^3+5y^2-12y-36\,dy$$

$$= -2\pi\left(\frac{y^4}{4}+\frac{5}{3}y^3-6y^2-36y\Big]_0^3\right)$$

$$= \boxed{-2\pi\left(\frac{3^4}{4}+\frac{5}{3}\cdot3^3-6\cdot3^2-36\cdot3\right)}$$

Find the length of the curve.

3) $x = e^t - 5t$, $y = 4\sqrt{5}e^{t/2}$, $0 \le t \le 1$

$x'(t) = e^t - 5$ $\qquad x'(t)^2 = (e^t-5)^2 = e^{2t}-10e^t+25$

$y'(t) = 2\sqrt{5}e^{t/2}$ $\qquad y'(t)^2 = 20e^t$

$$\text{length} = \int_0^1 \sqrt{x'(t)^2+y'(t)^2}\,dt = \int_0^1 \sqrt{e^{2t}-10e^t+25+20e^t}\,dt$$

$$= \int_0^1 \sqrt{e^{2t}+10e^t+25}\,dt = \int_0^1 \sqrt{(e^t+5)^2}\,dt$$

$$= \int_0^1 e^t+5\,dt = e^t+5t\Big]_0^1 = e+5-1$$

$$= \boxed{e+4}$$