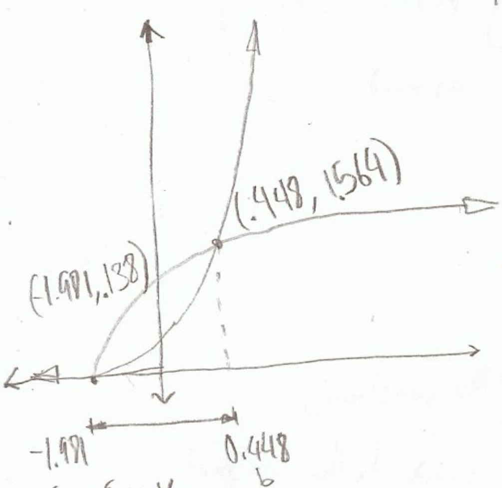
$y = \sqrt{x+2}$ $\quad y = e^x$



$a = x_1$
$b = x_2$

$a = -1.981$
$b = .448$

a) $$\int_a^b \pi\left(\sqrt{x+2}+2\right)^2 - \pi\left(e^x+2\right)^2 dx$$ around $y=-2$

$$\pi\int_{-1.981}^{.448}\left(\sqrt{x+2}+2\right)^2 dx - \pi\int_{-1.981}^{.448}\left(e^x+2\right)^2 dx$$

$$\pi\int_{-1.981}^{.448}(x+2)+4\sqrt{x+2}+4\,dx - \pi\int_{-.1981}^{.448} e^{2x}+4e^x+4\,dx$$

$$\pi\int_a^b x\,dx + \pi\int_a^b 6\,dx + 4\pi\int_a^b \sqrt{x+2}\,dx - \pi\left(\int_a^b e^{2x}dx + 4\int_a^b e^x dx + \int_a^b 4\,dx\right)$$

$$\left[\frac{\pi x^2}{2} + 6\pi x + \frac{8\pi\sqrt{x+2}^3}{3} - \frac{\pi e^{2x}}{2} - 4\pi e^x - 4\pi x\right]_a^b$$

(used the calculator to evaluate the expression)

↓

≈ 19.7247

b) (since the method "washer rotating around non-axis" is shown in the part "a)" and the calculator TI-84 has an area under the curve functionality I will complete the following parts using it)

around $y=2$

$$\pi\int_a^b (2-e^x)^2-(2-\sqrt{x+2})^2\,dx \approx \boxed{8.5357}$$

c) To rotate around the x-axis simply make the function's dependant variable y and change the integration bounds to the y-part of the coordinates where the two functions cross.

$$e^x=y \rightarrow \boxed{\ln(y)=x}$$

$$\sqrt{x+2}=y \rightarrow \boxed{y^2-2=x}\ \{0\le y\le\infty\}$$

$x=-3$

$$\pi\int_{a'}^{b'} (\ln(y)+3)^2-(y^2-2+3)^2\,dy \approx \boxed{15.5398}$$

$a'=.138$
$b'=1.564$

d) $$\pi\int_{a'}^{b'} (1-(y^2-2))^2-(1-\ln(y))^2\,dy \approx \boxed{12.7207}$$ $x=1$