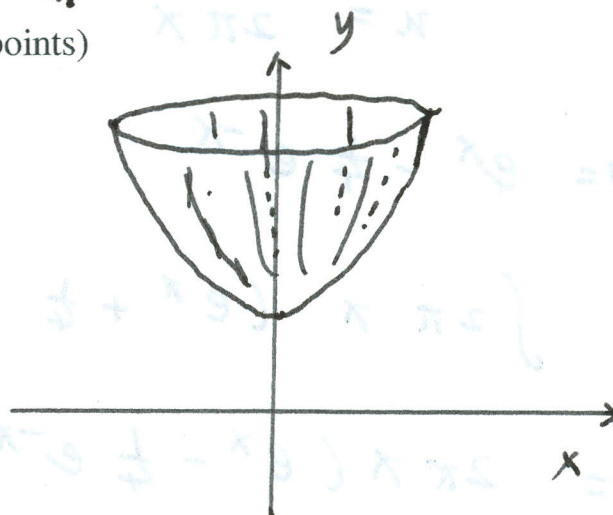
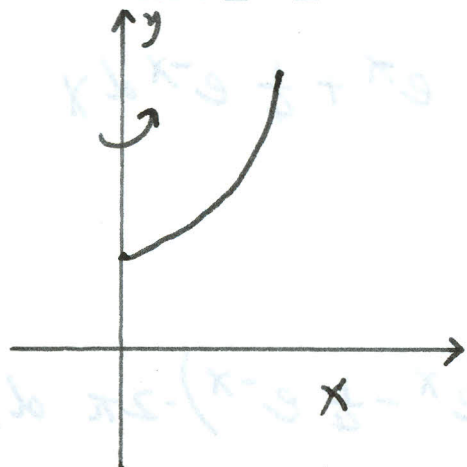


10. Find the area of the surface generated by rotating the curve

$$y = e^x + \frac{1}{4}e^{-x}$$

for $0 \leq x \leq 1$ about the y-axis. (10 points)



① rotate about the y-axis

$$A = \int 2\pi x \, ds$$

② ~~Let x be the variable~~ Let x be the ~~variable~~ variable

$$f(x) = e^x + \frac{1}{4}e^{-x}$$

$$f'(x) = e^x - \frac{1}{4}e^{-x}$$

$$\sqrt{1 + (f'(x))^2} = \sqrt{1 + (e^x - \frac{1}{4}e^{-x})^2}$$

$$= \sqrt{1 + e^{2x} - \frac{1}{2} + \frac{1}{16}e^{-2x}}$$

$$= \sqrt{e^{2x} + \frac{1}{2} + \frac{1}{16}e^{-2x}}$$

$$= \sqrt{(e^x + \frac{1}{4}e^{-x})^2} = e^x + \frac{1}{4}e^{-x}$$

③ ~~A =~~ $a = 0, b = 1$

$$③ A = \int_0^1 2\pi x \sqrt{1 + (f'(x))^2} \, dx$$