Math 1181H (§110) – Oct. 15, 2018 Full Name: ______________________________

Quiz 2

NOTE: Answers without proper justfication will receive NO credit

Problem 1. *(2 points)* Compute the integral $\int_0^2 x^2\sqrt{x^3+1}\,dx$.

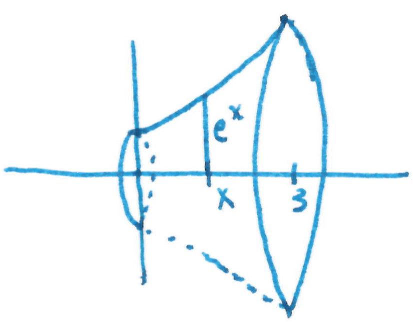
Use Substitution $u = 1+x^3 \rightsquigarrow du = 3x^2\,dx$ so $x^2\,dx = \frac{du}{3}$

$$\begin{cases} x=0 \text{ gives } u=1 \\ x=2 \text{ '' } u=9 \end{cases}$$

$$\int_0^2 x^2\sqrt{x^3+1}\,dx = \int_1^9 \sqrt{u}\,\frac{du}{3} = \frac{1}{3}\,\frac{2}{3}\,u^{3/2}\Big|_1^9 = \frac{2}{9}\left(9^{3/2}-1\right) = \frac{2}{9}\left(3^3-1\right)$$

$$= \frac{2}{9}(27-1) = \boxed{\frac{52}{9}}$$

Problem 2. *(3 points)* The area under the curve $y = e^x$ from $x = 0$ to $x = 3$ is revolved about the x-axis. Find the volume generated in this way.



$$A = \int_0^3 \pi\left(e^x\right)^2 dx$$

$$= \int_0^3 \pi e^{2x}\,dx$$

$u = 2x$

$du = 2dx$

$$\begin{cases} x=0 \text{ gives } u=0 \\ x=3 \text{ '' } u=6 \end{cases}$$

$$= \int_0^6 \pi e^u \,\frac{du}{2}$$

$$= \frac{\pi}{2} e^u \Big|_0^6 = \frac{\pi}{2}\left(e^6 - e^0\right) = \boxed{\frac{\pi}{2}\left(e^6-1\right)}$$