NAME: STUDENT NO:

Q-2 Evaluate the integral $\displaystyle\int_0^4 \int_{\sqrt{y}}^2 \frac{1}{1+x^3}\, dx\, dy$.

Solution:

$$\begin{aligned}
\int_0^4 \int_{\sqrt{y}}^2 \frac{1}{1+x^3}\, dx\, dy &= \int_0^2 \int_0^{x^2} \frac{1}{1+x^3}\, dy\, dx \\
&= \int_0^2 \left(\frac{y}{1+x^3}\bigg|_0^{x^2} \right) dx \\
&= \int_0^2 \frac{x^2}{1+x^3}\, dx \\
&= \left(\frac{1}{3}\ln(1+x^3)\bigg|_0^2 \right) \\
&= \frac{1}{3}\ln 9 \\
&= \frac{2}{3}\ln 3.
\end{aligned}$$