

W04 Regular

Due date: Sunday 2/8, 11:59pm

01

Arc length - tricky integration

Find the arc length of the curve $y = e^x$ for $x \in [0, 1/2]$.

(Hint: the integral can be done using either: (i) u -sub then trig sub, or (ii) ‘rationalization’ then partial fractions.)

 **Surface area: cone**

A *cone* may be described as the surface of revolution of a ray emanating from the origin, revolved around the *x-axis*.

Let $f(x) = mx$ for some $m > 0$. Find the surface area of the cone given by revolving the graph of f around the *x-axis* over $x \in [0, h]$.

Can you also calculate this area using geometry? And verify the two methods give the same formula? (Hint: ‘unroll’ the cone into a sector.)

 **Surface area: parabolic reflector**

A parabolic reflector is given by rotating the curve $y = x^2$ around the *y-axis* for $x \in [0, 2]$.

What is the surface area of this reflector?