

Show all of your work, completely simplify your answers, and give exact values only.

1. Evaluate:  $\int \sin 2x \sinh 3x dx$

2. Determine the arclength for  $y = \frac{1}{4} \ln(\sec 4x + \tan 4x) - \frac{1}{16} \sin 4x$  over  $\left[0, \frac{\pi}{6}\right]$

3. Evaluate:  $\int \sin^6 x dx$

4. Consider  $y = \cosh x$  over the interval  $[0,1]$ . Determine the surface area of the surface of revolution obtained by revolving this curve about the  $x$ -axis.

5. Evaluate:  $\int (x-2)^3 3^x dx$

6. Evaluate:  $\int \csc^5 x dx$

7. Consider the graph of  $y = \tan^{-1} x$  over  $[0,1]$ . Determine the  $x$ -coordinate for the centroid of this region.