Worksheet 5

Problem 1

Let R be the region bounded by the curve 2^x, the x-axis, the y-axis, and the line $x = 1$. Find the volume of the solid obtained by rotating R around the y-axis using:

(a) the shell method

(b) the washer method

Verify that your answers agree.

Problem 2

Let R be the region bounded by the curve $\arctan(x)$, the x-axis, the y-axis, and the line $x = 1$. Find the volume of the solid obtained by rotating R around $x = -1$.

Problem 3

Find a formula for the anti-derivative of damped harmonic motion $e^{-kt} \sin(\omega t)$ where $k > 0$ and ω is the frequency.

Hint: To do this, you have to perform integration by parts twice, each time taking $v'(t) = e^{-kt}$. Then you have to do a little algebra at the end to solve for the unknown anti-derivative.