

# Written Problem 7

The goal of this assignment is to evaluate this integral:

$$\int_1^{e^4} \pi(4 - \ln y) dy.$$

New methods we will learn in Chapter 7 will allow us to calculate an antiderivative of  $\ln y$ , but for now we don't know. The following steps will guide you through another way of solving this problem using methods we already know.

1. **The given definite integral can be viewed as a volume calculation. What solid of revolution, using the washer method, would yield such an integral as the volume?**

*Remember the volume of a washer is given by,*

$$V_{washer} = \pi(R^2 - r^2)$$

*where  $R$  is the outer radius, and  $r$  is the inner radius.*

2. **Use a different method of calculating volumes of solids of revolution to set up a new definite integral equal to the given one. Draw graphs and pictures.**
3. **Evaluate the new integral. The substitution method may be helpful.**

As always, present your solution and reasoning clearly. Use complete sentences, and diagrams and graphs as needed.