1 Find the area of the region bounded by the following: \( y = \frac{1}{x}, y = x^2, y = 0 \) and \( x = e \).

2 Find the volume of the solid obtained by rotating the region between \( x = 1 + y^2 \) and \( y = x - 3 \) about the \( y-axis\).

3 Find the volume of the solid obtained by rotating the region between \( y = \sin 2x \) when \( x \) is in the interval \([0, \pi]\) about the \( y-axis\).

4 Find the volume of the solid obtained by rotating the region between \( y = x^2 \) and \( y = x \) about the line \( y = 2 \).

5 The height of a monument is 20m. A horizontal cross-section at a distance \( x \) meters from the top is an equilateral triangle with side \( \frac{1}{4}x \) meters. Find the volume of the monument.

6 Find the average value of the function \( f(t) = t \sin(t^2) \) on the interval \([0, 10]\) and find the number \( c \) such that \( f(c) \) equals the average.

7 Find the volume of the solid obtained by rotating the region bounded by \( y = \ln x, y = 0, x = 2 \) about the \( x-axis\).

8 In the spirit of Valentine’s Day, who is the love of Buffy’s life? (Choose among the five Buffy lovers)

   Angel, Parker, Riley, Spike, Satsu