1 Set up the integral to find the arc length of \( y = x \sin (x) \) from 0 to \( 6\pi \). Approximate this integral by using midpoint rule with \( n = 3 \).

2 The demand curve of tortillas is \( D(x) = 1984 - 12x \) and the supply is \( s(x) = 19x \). Find the consumer surplus and the producer surplus for a tortilla selling company.

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

4 Find the area of the region between \( y = x^2 + 7x \) and \( y = 12x - 6 \).

5 The height of a monument is 20m. A horizontal cross-section at a distance \( x \) meters from the top is an rectangle with width \( \frac{1}{4}x \) meters and length \( e^{x^2} \). Find the volume of the monument.

6 Find the derivative of the following function:

\[
g(x) = \int_{\ln x}^{x^2} \frac{t}{\sqrt{2 + t^2}} \, dt
\]

7 Evaluate the following integrals:

\[
\begin{align*}
\int_0^2 \sqrt{4 - x^2} \, dx \\
\int_1^7 2^x \, dx \\
\int (x + 1)^2 e^{2x} \, dx \\
\int x \sin x \, dx \\
\int x^2 (x^3 - 2x + 1)^7 \, dx
\end{align*}
\]

8 Find the volume obtained by rotating the region between \( y = x^2 \) and \( y = x \) rotated around \( y = 3 \).

9 If Superman fought Yoda, who would win and why?