1) Find the length of the graph of \( f(x) = e^x + e^{-x}, \, 0 \leq x \leq 1. \)

2) Find the area of the surface generated by revolving about the \( x \)-axis the curve with the following parametric representation: \( x(t) = t^2, y(t) = t, \, 1 \leq t \leq 4. \)

3) Let \( R \) be the region between the graphs of \( f(x) = x^3 \) and \( g(x) = x^2 \) on \([0, 1]\). Find the center of gravity of \( R \) and the volume of the solid obtained by revolving \( R \) about the \( y \)-axis.

4) A tank containing \( 144\pi \) cubic feet of water has the shape of a cone with vertex at the bottom, with height of 20 feet and radius of 10 feet. Find the work needed to pump all the water to a point 10 feet above the tank.

5) Find a maximal interval on which \( f(x) = x^3 \) has an inverse.

6) Find the limit
\[
\lim_{x \to 0} \frac{\arcsin(x)}{x}.
\]

7) Solve the differential equation:
\[
\frac{dy}{dx} + y \sin(x) = \sin(x).
\]

8) Find the integral
\[
\int \frac{\cos(x)}{1 + \sin^2(x)} \, dx.
\]

9) Find the integral
\[
\int x^2 \log_2(x^3) \, dx.
\]

10) Determine whether the improper integral converges. If it does, determine its value:
\[
\int_{-\infty}^{-2} \frac{1}{x^2 + 4} \, dx.
\]

11) Find the interval of convergence of the series:
\[
\sum_{n=2}^{\infty} (-1)^n \frac{(\log_2(n))^2}{n^2} x^n.
\]
Explain which modes of convergence appear.

12) Determine whether the series converges

$$\sum_{n=1}^{\infty} \frac{1}{n + \sqrt{n}}.$$

13) Find the Taylor series of \(f(x) = \sin(x)\) at \(a = \pi/4\).

14) Find all 3rd roots of \(i\).

15) Find the length of the polar curve \(r = 2\cos(\theta)\) and the area bounded by this curve.