1. Evaluate the integrals.

(a) \[ \int \sin^{-1} x \, dx \]

(b) \[ \int \frac{2x - 1}{4x^2 + 4x + 1} \, dx \]
2. Calculate the limits.

(a) \[ \lim_{x \to 1} \left( \frac{1}{x - 1} - \frac{1}{\ln x} \right) \]

(b) \[ \lim_{x \to 0} (\cosh x)^{x^{-2}} \]
3. Given that $f(0) = 3$, $f(2) = 1$ and $f'(2) = 4$, calculate

$$\int_0^2 x f''(x) \, dx$$
4. Differentiate the following functions.

\[(a) \quad f(x) = \frac{\tan^{-1} x}{\tan x}\]

\[(b) \quad f(x) = 2^{xe}\]
5. The volume of the solid of revolution obtained by rotating the region of the first quadrant bounded by the curve \( y = 3^x \) and the line \( x = a \), for \( a > 0 \), about the \( x \)-axis is equal to \( \pi \). Find the value of \( a \).