1. Evaluate the following integrals.

(a) \[ \int \frac{4x^2 + 3}{x^2 + 1} \, dx \]

(b) \[ \int \sqrt{x} \ln x \, dx \]

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

(d) \[ \int 10x^3 \cos x \, dx \]

(e) \[ \int \sec^6 x \, dx \]

(f) \[ \int \frac{x^3}{\sqrt{4 + x^2}} \, dx \]

(g) \[ \int \frac{6x^2 - 3x + 1}{(x^2 + 1)(x - 1)} \, dx \]

(h) \[ \int_0^9 \frac{1}{\sqrt{9-x}} \, dx \]

(i) \[ \int \frac{(\sin x + \cos x)^2 - 1}{\tan^4 x} \, dx \]

2. Find a general formula for \( a_n \), the \( n \)th term of the following sequence. Does this sequence converge or diverge? Explain. If the sequence converges, be sure to find its limit.

\[ -\frac{\cos 1}{2}, -\frac{\cos 2}{4}, -\frac{\cos 3}{6}, -\frac{\cos 4}{8}, -\frac{\cos 5}{10}, -\frac{\cos 6}{12}, -\frac{\cos 7}{14}, \ldots \]

3. Prove that the sequence below is either strictly increasing or strictly decreasing.

\[ \frac{n^n}{n!} \]