1. Find $\int \cos^3 x \, dx$. Check your answer.

2. Find $\int \cos^2 x \, dx$.

3. Find $\int x \ln x \, dx$. Check your answer.

4. Find $\int \frac{x + 1}{(x - 3)^2} \, dx$. Check your answer.

5. Find $\int \frac{1}{\sqrt{1 + x^2}} \, dx$. Check your answer.

6. Find $\lim_{x \to +} \frac{\sin x}{x}$.

7. Find the limit of the sequence whose $n^{\text{th}}$ term is $a_n = \left(\frac{n + 3}{n}\right)^n$.

8. Find $\int_{1}^{3} \frac{1}{(x - 2)^2} \, dx$.

9. Does the series $\sum_{k=1}^{\infty} \frac{1}{k}$ converge or diverge? If the series converges, what is its sum? Explain your answer.

10. Does the series $\sum_{k=1}^{\infty} \frac{4}{7^k}$ converge or diverge? If the series converges, what is its sum? Explain your answer.