

Problem 1: 39

Problem 2: $\frac{1}{2} \sec^2 x + C$ or $\frac{1}{2} \tan^2 x + C$ (both work)

Problem 3: 256π

Problem 4: $-\frac{\ln x}{x} - \frac{1}{x} + C$

Problem 5: 4π

Problem 6: $-\left(\frac{\cos^{499} x}{499} - \frac{\cos^{501} x}{501}\right) + C$

Problem 7: $\sin^{-1}\left(\frac{x}{3}\right) + C$

Problem 8: $-\frac{3}{x+1} + C$

Problem 9: The integral diverges.

Problem 10: The integral converges.

Problem 11: $\frac{16}{117}$

Problem 12: The series diverges.

Problem 13: The series converges.

Problem 14: The series converges.

Problem 15: The series converges on the interval $[-1, 1]$.

Problem 16: $f(x) = 2 \sum_{n=0}^{\infty} (-1)^n x^{2n+1}$

Problem 17: $x^2 e^{x^2} = \sum_{n=0}^{\infty} \frac{x^{2n+2}}{n!}$ converges on $(-\infty, \infty)$.

Problem 18: $\arctan(x^2) = 2 \sum_{n=0}^{\infty} \frac{(-1)^n x^{4n+2}}{4n+2} = \sum_{n=0}^{\infty} \frac{(-1)^n x^{4n+2}}{2n+1}$ converges on $[-1, 1]$.