1. Evaluate the following integrals.
   a) (5 pt) \( \int \frac{x}{(R^2-x^2)^2} \, dx \).
   b) (5 pt) \( \int \frac{dx}{(x^2+R^2)^2} \).
   c) (5 pt) \( \int \sqrt{2x^2 - x} \, dx \).

2. Find the partial fractions decomposition form for the following (do not solve for the constants):
   \[
   \frac{x^2 + 3}{(x^2 - x - 12)^3(x^4 - 16)(x^2 + x + 1)^3}.
   \]
(1) \( \sin(2x) = 2 \sin(x) \cos(x) \)
(2) \( \cos(2x) = \cos^2(x) - \sin^2(x) \)
(3) \( \cos^2(x) = \frac{1}{2} + \frac{1}{2} \cos(2x) \)
(4) \( \sin^2(x) = \frac{1}{2} - \frac{1}{2} \cos(2x) \)
(5) \( \sin(A) \cos(B) = \frac{1}{2} [\sin(A - B) + \sin(A + B)] \)
(6) \( \sin(A) \sin(B) = \frac{1}{2} [\cos(A - B) - \cos(A + B)] \)
(7) \( \cos(A) \cos(B) = \frac{1}{2} [\cos(A - B) + \cos(A + B)] \)
(8) \( e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!} \)
(9) \( \sin(x) = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{(2n+1)!} \)
(10) \( \cos(x) = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n}}{(2n)!} \)
(11) \( |E_M| \leq \frac{K(b-a)^3}{24n^4} \)
(12) \( |E_T| \leq \frac{K(b-a)^3}{12n^2} \)
(13) \( |E_S| \leq \frac{K(b-a)^5}{180n^4} \)
(14) \( L = \int_a^b \sqrt{1 + \left(\frac{dy}{dx}\right)^2} \, dx = \int_a^b \sqrt{(\frac{dx}{dt})^2 + (\frac{dy}{dt})^2} \, dt = \int_a^b \sqrt{r^2 + (\frac{dr}{d\theta})^2} \, d\theta \)
(15) \( S = \int_a^b 2\pi(x \text{ or } y) \, ds \)
(16) \( \int_{n+1}^{\infty} f(x) \, dx \leq R_n \leq \int_{n}^{\infty} f(x) \, dx \)
(17) \( \bar{x} = \frac{1}{A} \int_a^b x(f(x) - g(x)) \, dx \)
(18) \( \bar{y} = \frac{1}{2A} \int_a^b [(f(x))^2 - (g(x))^2] \, dx \)
(19) \( A = \int_a^b \frac{1}{2} r^2 \, d\theta \)
(20) \( \int \sec(x) \, dx = \ln |\sec(x) + \tan(x)| + c \)
(21) \( \int \sec^3(x) \, dx = \frac{1}{2} \sec(x) \tan(x) + \frac{1}{2} \ln |\sec(x) + \tan(x)| + c \)