

1. Evaluate

$$\int \frac{2x + 4}{x^3 - 2x^2} dx$$

2. Find the form of the partial fractions decomposition of

$$\frac{x^3 - 3}{x(x^2 + 1)^2}.$$

Do not solve for the constants.

3. Decide whether

$$\int_1^{\infty} \frac{dx}{x^2 + 1}$$

converges or diverges. If it converges, evaluate it.

4. Find the following limits, if they exist, or show that they do not exist.

a)  $\lim_{x \rightarrow 0^+} \frac{1 - \cos x}{x^3}$       b)  $\lim_{x \rightarrow 1} x^{\frac{1}{1-x}}$

5. a)  $\int_e^{e^2} \frac{dx}{x \ln x}$       b)  $\int x \ln x dx$

6. a)  $\int \sin^3 x \cos^2 x dx$       b)  $\int \tan^3 2x dx$

7. a)  $\int_0^{\frac{\pi}{2}} e^{\cos x} \sin x dx$       b)  $\int \frac{x}{2x + 1} dx$

8. a)  $\int \frac{dx}{x^2 + 2x + 2}$       b)  $\int \frac{dx}{x^2 \sqrt{1 - x^2}}$

9. a)  $\int \tan^3 x dx$       b)  $\int \frac{dx}{\sqrt{x^2 + 8x + 25}}$

10. a)  $\int e^{2x} \sin x dx$       b)  $\int \sin^4 \left( \frac{x}{2} \right) dx$       c)  $\int_{-4}^{-3} \frac{dx}{x^2 + 6x + 10}$

11. a)  $\int \tan^{-1} x dx$       b)  $\int \frac{3x + 6}{(x - 2)(x^2 + 2x + 4)} dx$       c)  $\int_0^{\sqrt{7}} \sqrt{7 - x^2} dx$

12. Determine whether the following integral converges. If it does, find its value.

$$\int_0^2 \frac{dx}{\sqrt[3]{(x - 1)^4}}$$