



Integration Techniques

Questions

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The Power Rule

Q1) Use the power rule to evaluate the following integrals.

a) $\int x^2 dx$

c) $\int (x^2 + 3) dx$

b) $\int 2x^3 dx$

d) $\int 2x^{-3} dx$

Q2) Use the power rule to evaluate the following integrals.

a) $\int -x^{-3} dx$

c) $\int \frac{x^{-4}}{-2} dx$

b) $\int -\frac{1}{2}x^3 + 2x dx$

d) $\int 2x^{-3} + \frac{1}{4}x^3 dx$

Q3) Rewrite the expression in an integratable form and evaluate.

a) $\int \frac{5}{x^4} dx$

c) $\int \sqrt{x} dx$

b) $\int \frac{3}{2x^2} dx$

d) $\int 2\sqrt[4]{x} dx$



Definite Integrals

Q1) Evaluate the following definite integrals.

a) $\int_1^3 2x + 4 \, dx$

c) $\int_{-1}^2 3x^2 + 5x \, dx$

e) $\int_0^3 2x + 1 \, dx$

b) $\int_0^4 6 - 3x \, dx$

d) $\int_{-2}^2 2x^3 \, dx$

f) $\int_{-2}^1 5 - x^3 \, dx$

Integration by U-Substitution

Q1) Use the given substitution to evaluate the integral.

a) $\int x\sqrt{1+x} \, dx$ using $u = 1 + x$

c) $\int \sin^3 x \, dx$ using $u = \cos x$

b) $\int \frac{2}{\sqrt{x}(x-4)} \, dx$ using $u = \sqrt{x}$

d) $\int \sec^4 x \, dx$ using $u = \tan x$

The Chain Rule

Q1) Evaluate the following integrals using the reverse chain rule.

a) $\int (x + 4)^2 \, dx$

d) $\int (x - 4)^7 \, dx$

b) $\int (2x + 5)^3 \, dx$

e) $\int \left(\frac{2x}{3} + 5\right)^2 \, dx$

c) $\int (3x - 5)^2 \, dx$

f) $\int (3 - 4x)^3 \, dx$

Q2) Rewrite the following to an integratable form and evaluate.

a) $\int \frac{1}{(2x - 3)^{-2}} \, dx$

c) $\int \frac{1}{(3x - 2)^2} \, dx$

b) $\int \frac{2}{(5 - 3x)^{-3}} \, dx$

d) $\int \sqrt{(5x - 4)} \, dx$

Integration by Parts

Q1) Evaluate the following integrals.

a) $\int x \sin x \, dx$

d) $\int \frac{\ln x}{x^3} \, dx$

b) $\int x e^x \, dx$

e) $\int (x^2 + 1) \ln x \, dx$

c) $\int x \sec x \tan x \, dx$

f) $\int 12x^2(3 + 2x)^5 \, dx$



Q2) Evaluate the following definite integrals.

a) $\int_0^{\ln 2} x e^{2x} dx$

b) $\int_0^{\frac{\pi}{2}} x \sin x dx$

Integration using Partial Fractions

Q1) Use partial fractions to evaluate the integral.

a) $\int \frac{3x+5}{(x+1)(x+2)} dx$

b) $\int \frac{3x-1}{(2x+1)(x-2)} dx$

c) $\int \frac{2x-6}{(x+3)(x-1)} dx$

d) $\int \frac{3}{(2+x)(1-x)} dx$

Integrating the Trigonometric Functions

Q1) Evaluate the following integrals with respect to x .

a) $\int 5 \cos x dx$

d) $\int 2 \cos(2x) dx$

b) $\int 3 \sin x dx$

e) $\int 6 \sin\left(\frac{3}{2}x\right) dx$

c) $\int -\frac{1}{3} \cos x dx$

f) $\int -8 \cos(4x) dx$

Improper Integrals

Q1) Evaluate the following improper integrals.

a) $\int_1^{\infty} \frac{1}{x^3} dx$

b) $\int_2^{\infty} x^{-\frac{3}{2}} dx$

Q2) Show that the following improper integrals diverge.

a) $\int_0^{\infty} e^x dx$

b) $\int_1^{\infty} \frac{1}{\sqrt{x}} dx$