Self-Assessment Quiz

Calculus – Integration

(Partial Fractions & Improper Integrals)

Instructions: This quiz is for self-assessment only. There is no grading.

Multiple Choice Questions

Q1. Partial fraction decomposition is used to integrate:

(a) Polynomial functions

(b) Rational functions

(c) Trigonometric functions

(d) Exponential functions

Q2. Partial fractions can be applied directly when:

(a) Degree of numerator $>$ degree of denominator

(b) Degree of numerator $=$ degree of denominator

(c) Degree of numerator $<$ degree of denominator

(d) Denominator has no real roots

Q3. If the degree of the numerator is greater than the denominator, the first step is:

(a) Factor the denominator

(b) Use substitution

(c) Polynomial division

(d) Integration by parts

Q4. A denominator with distinct linear factors gives partial fractions of the form:

(a) $\frac{A}{x-a}$

(b) $\frac{A}{x-a} + \frac{B}{x-b}$

(c) $\frac{Ax+B}{x-a}$

(d) $\frac{A}{(x-a)^2}$

Q5. For a repeated linear factor $(x-a)^2$, the decomposition includes:

(a) Only $\frac{A}{x-a}$

(b) Only $\frac{B}{(x-a)^2}$

(c) $\frac{A}{x-a} + \frac{B}{(x-a)^2}$

(d) $\frac{Ax+B}{(x-a)^2}$

Q6. For an irreducible quadratic denominator, the numerator must be:

(a) A constant

(b) A linear expression

(c) A quadratic expression

(d) Zero

Q7. Which integral requires partial fractions?

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

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

(c) $\int e^x\,dx$

(d) $\int \sin x\,dx$

Q8. The integral $\int \frac{1}{(x-1)(x+1)}\,dx$ leads to:

(a) One constant term

(b) Two linear terms

(c) Two simple fractions

(d) A quadratic numerator

Q9. An integral is called improper if:

(a) The integrand is continuous

(b) Limits are finite

(c) Limits are infinite or integrand is discontinuous

(d) Antiderivative exists

Q10. Improper integrals are evaluated using:

(a) Substitution

(b) Integration by parts

(c) Partial fractions

(d) Limits

Q11. The integral $\int_1^\infty \frac{1}{x^p}\,dx$ converges when:

(a) $p = 1$

(b) $p < 1$

(c) $p > 1$

(d) $p = 0$

Q12. The improper integral $\int_0^1 \frac{1}{x}\,dx$ is:

(a) Convergent

(b) Divergent

(c) Zero

(d) Finite

Q13. If an improper integral has a finite value, it is said to:

(a) Diverge

(b) Oscillate

(c) Converge

(d) Collapse

Q14. Which integral is improper due to a discontinuity?

(a) $\int_0^2 x\,dx$

(b) $\int_1^3 \ln x\,dx$

(c) $\int_0^1 \frac{1}{x^2}\,dx$

(d) $\int_2^4 x^2\,dx$

Q15. An improper integral with infinite limits must be split when:

(a) Limits are symmetric

(b) There is a vertical asymptote

(c) Integrand is polynomial

(d) Antiderivative is simple

Q16. If an improper integral does not converge, its value is:

(a) Zero

(b) Finite

(c) Undefined

(d) Negative

Answer Key

Q1:(b)	Q2:(c)	Q3:(c)	Q4:(b)
Q5:(c)	Q6:(b)	Q7:(b)	Q8:(c)
Q9:(c)	Q10:(d)	Q11:(c)	Q12:(b)
Q13:(c)	Q14:(c)	Q15:(b)	Q16:(c)