Self-Assessment Quiz: Techniques of Integration

Substitution Method and Integration by Parts
Ungraded Quiz – For Conceptual Practice

Q1. Which substitution is most appropriate to evaluate $\int 2x\cos(x^2)\,dx$?

(a) $u = \cos(x^2)$
(b) $u = x^2$
(c) $u = 2x$
(d) $u = \sin(x)$

Q2. The substitution method is primarily based on which rule of differentiation?

(a) Product Rule
(b) Quotient Rule
(c) Chain Rule
(d) Power Rule

Q3. Evaluate $\int \frac{1}{x}\,dx$ using substitution.

(a) $\ln|x| + C$
(b) $x^{-1} + C$
(c) $\frac{1}{x^2} + C$
(d) $e^x + C$

Q4. Which integral is best solved using substitution?

(a) $\int xe^x\,dx$
(b) $\int \ln x\,dx$
(c) $\int \frac{2x}{x^2+1}\,dx$
(d) $\int x\sin x\,dx$

Q5. In the substitution method, what must du represent?

(a) The original function
(b) A constant
(c) The derivative of the substitution variable
(d) The antiderivative

Q6. Which formula represents integration by parts?

(a) $\int u\,dv = uv - \int v\,du$
(b) $\int u\,dv = du - v$

(c) $\int u\,dv = uv + \int v\,du$

(d) $\int u\,dv = u + v$

Q7. Which choice of u is preferred when applying integration by parts?

(a) Trigonometric functions

(b) Exponential functions

(c) Logarithmic functions

(d) Polynomial functions

Q8. Which integral requires integration by parts?

(a) $\int \cos x\,dx$

(b) $\int e^{2x}\,dx$

(c) $\int x \ln x\,dx$

(d) $\int \frac{1}{x}\,dx$

Q9. When applying integration by parts to $\int xe^x\,dx$, which is the correct choice?

(a) $u = e^x$, $dv = x\,dx$

(b) $u = x$, $dv = e^x\,dx$

(c) $u = xe^x$, $dv = dx$

(d) $u = e^{2x}$, $dv = dx$

Q10. The LIATE rule helps in:

(a) Selecting limits of integration

(b) Choosing substitution variables

(c) Choosing u in integration by parts

(d) Evaluating definite integrals

Q11. Which function appears first in the LIATE hierarchy?

(a) Algebraic

(b) Trigonometric

(c) Exponential

(d) Logarithmic

Q12. Which technique is more suitable for $\int x \sin x\,dx$?

(a) Substitution

(b) Partial fractions

(c) Integration by parts

(d) Trigonometric identities

Q13. Which statement is correct?

(a) Substitution always simplifies integrals

(b) Integration by parts applies only to definite integrals

(c) Some integrals require repeated integration by parts

(d) Integration by parts never increases complexity

Answers (for self-check):

1(b), 2(c), 3(a), 4(c), 5(c), 6(a), 7(c), 8(c), 9(b), 10(c), 11(d), 12(c), 13(c)