Self-Assessment Quiz

Calculus – Integration Techniques
(Substitution Method & Integration by Parts)

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

Multiple Choice Questions

Q1. The substitution method is mainly used when:

(a) The integrand is a product of functions
(b) The integrand contains a function and its derivative
(c) The integrand is a rational function
(d) The limits are infinite

Q2. For the integral $\int 2x\cos(x^2)\,dx$, the best substitution is:

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

Q3. If $u = x^2 + 1$, then $du =$:

(a) dx
(b) $2x\,dx$
(c) $(x^2 + 1)\,dx$
(d) $2\,dx$

Q4. Which integral is most suitable for substitution?

(a) $\int xe^x dx$
(b) $\int \sin x \cos x\,dx$
(c) $\int \ln x\,dx$
(d) $\int x^2 dx$

Q5. In definite integrals using substitution, what must be changed?

(a) Only the integrand
(b) Only the variable
(c) Only the limits
(d) The variable and the limits

Q6. The formula for integration by parts is:

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

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

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

(d) $\int v\,du = uv$

Q7. Integration by parts is derived from:

(a) Chain rule

(b) Quotient rule

(c) Product rule

(d) Fundamental theorem of calculus

Q8. Which choice of u is best for $\int xe^x dx$?

(a) $u = e^x$

(b) $u = x$

(c) $u = dx$

(d) $u = xe^x$

Q9. The LIATE rule helps in:

(a) Choosing limits

(b) Choosing substitution

(c) Choosing u in integration by parts

(d) Solving differential equations

Q10. According to LIATE, which has higher priority?

(a) Algebraic

(b) Trigonometric

(c) Exponential

(d) Logarithmic

Q11. Which integral requires integration by parts?

(a) $\int \frac{1}{x} dx$

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

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

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

Q12. For $\int \ln x\,dx$, choose u:

(a) $u = x$

(b) $u = \ln x$

(c) $u = dx$

(d) $u = 1/x$

Q13. Integration by parts may need to be applied:

(a) Only once

(b) Exactly twice

(c) Repeatedly

(d) Never

Q14. Which method is suitable for $\int \cos(3x)\, dx$?

(a) Integration by parts

(b) Substitution

(c) Partial fractions

(d) Series expansion

Q15. The result of $\int e^x \sin x\, dx$ involves:

(a) Only substitution

(b) Only direct integration

(c) Repeated integration by parts

(d) Partial fractions

Q16. Which of the following is TRUE?

(a) Substitution is based on product rule

(b) Integration by parts simplifies products of functions

(c) Both methods give the same result always

(d) Integration by parts works only for polynomials

Q17. In substitution method, the goal is to:

(a) Increase complexity

(b) Eliminate constants

(c) Simplify the integral

(d) Change limits only

Q18. Which integral can be solved by either method?

(a) $\int xe^{x^2} dx$

(b) $\int xe^x dx$

(c) $\int \frac{1}{x} dx$

(d) $\int \sin x dx$

Answer Key

Q1:(b)	Q2:(b)	Q3:(b)	Q4:(b)
Q5:(d)	Q6:(a)	Q7:(c)	Q8:(b)
Q9:(c)	Q10:(d)	Q11:(b)	Q12:(b)
Q13:(c)	Q14:(b)	Q15:(c)	Q16:(b)
Q17:(c)	Q18:(b)		