

Integration by Parts

1. Integration by parts is a technique used when the integrand is a product of two functions where what technique will not work? u -sub
2. What is the formula for integration by parts? $uv - \int v du$
3. What memory trick allows you to most efficiently choose u ? LIATE
4. True or False: When using integration by parts, the technique may be applied more than once.
5. When can you use tabular integration? u = polynomial
6. In using tabular integration, which expression is differentiated and when do you stop differentiating? u ; until 0 is reached
7. Which expression is integrated and when do you stop? dv ; complete table
8. Where are the uv pairs located and how do you form the antiderivative? on diagonals; ~~1st~~ term odd terms leave alone, evens change sign

Partial Fractions

1. Partial fractions is a technique used when the integrand is a quotient of two functions where what technique will not work? u -sub
2. Partial fractions can only be used to evaluate an integral when what is true of the denominator? factors
3. Before applying partial fractions, what must you check? proper fraction
4. If the algebraic fraction is improper, what must you do first? long divide
5. If one of the factors of the denominator is $ax + b$ where a is different from 0 and 1, what must you remember in integrating that section? $\frac{1}{a}$ outside
6. When the denominator has a repeated linear factor, what must you use in your decomposition? each power
7. When the denominator has a prime quadratic factor, what must you use in your decomposition? $\frac{Ax+B}{x^2+\#}$

Trigonometric Integrals

1. If the integrand has an odd power of \sin or \cos , what identity will you have to use in order to evaluate the integral? $\sin^2 x + \cos^2 x = 1$
2. If the integrand has an odd power of \sin or \cos , how will you use the identity to perform a u -substitution? save one for du
3. State the version of the double angle formula for cosine that is used to integrate $\sin^2 x$. $\frac{1 - \cos(2x)}{2}$
4. State the version of the double angle formula for cosine that is used to integrate $\cos^2 x$. $\frac{1 + \cos(2x)}{2}$
5. What identity relates $\tan^2 x$ to $\sec^2 x$? $1 + \tan^2 x = \sec^2 x$
6. What identity relates $\cot^2 x$ to $\csc^2 x$? $1 + \cot^2 x = \csc^2 x$
7. How do you use your answers to the first two questions to integrate $\tan^2 x$ and $\cot^2 x$? change to $\sec^2 x$ & $\csc^2 x$
8. What are the three possibilities for evaluating an integral expression involving powers of \tan and \sec ?

• $u = \tan x, du = \sec^2 x dx$

- $u = \sec x$, $du = \sec x \tan x dx$
- change to sin and cos

9. How do you decide which to use? whichever works easiest and uses whole original

Trigonometric Substitutions

1. Try a trig sub ONLY when what technique fails?
2. How do you decide which substitution to use?
3. Remember to account for $d\theta$ and dx . Watch principal square roots.
4. Remember Ranges!!

Numerical Methods

1. State the formula for finding the area of a trapezoid. $\frac{1}{2}h(b_1 + b_2)$
2. In the Trapezoidal Rule, the partition is regular. What is Δx ? $\frac{b-a}{n}$
3. What is the Trapezoidal Rule? $\frac{1}{2}\Delta x (y_0 + 2y_1 + 2y_2 + \dots + 2y_{n-1} + y_n)$
4. How do you create a trapezoidal approximation for a non regular partition? Trapezoid by trapezoid
5. To increase the accuracy of a trapezoidal approximation, what must be done? increase h
6. Simpson's Rule requires a uniform partition. What is Δx ? $\frac{b-a}{n}$
7. State Simpson's Rule. $\frac{1}{3} \cdot \Delta x (y_0 + 4y_1 + 2y_2 + 4y_3 + 2y_4 + \dots + 2y_{n-2} + 4y_{n-1} + y_n)$
8. ~~True~~ or False: A trapezoidal approximation requires a regular partition with an even n .
9. True or ~~False~~: Simpson's Rule requires a regular partition with an even n .

Improper Integrals

1. An integral is classified as improper when one of the following conditions occur. Note that in each case, the Fundamental Theorem of Calculus CANNOT be applied.

- a or b or both are infinite y -values
- discontinuity at interior point
- discontinuity at endpoint

2. Since an improper integral will fail to satisfy the hypotheses of the FTC, what notation will be introduced in order to correct the deficit? LIMITS

3. How will you establish the convergence or divergence of an improper integral? Evaluate limit
4. For which case of question 1 will your integral expression have to be split into two improper integrals? interior disc.
5. If you must split your integral expression, what must be true in order to have the original integral classified as convergent? Both parts must converge