Week 2 Topics: Trigonometric Identities and powers of trigonometric functions, inverse trigonometric functions, integration by parts, trigonometric substitution, Partial Fraction decomposition, and integration using tables.

**SHOW ALL YOUR WORK FOR FULL CREDIT, including highlighting your final answer. Note that answers provided without supporting steps will earn approximately 1/3 credit.**

1. Integrate

2.) Integrate 

3.) Integrate

4.) Integrate

5.) Integrate

## 6.) Using the list:

## (a) inverse sine; (b) inverse tangent; (c) logarithmic; (d) general power; or (e) none of these,

## identify the form of each of the following integrals. Do not integrate.

 = \_\_\_\_\_\_\_  = \_\_\_\_\_\_\_  = \_\_\_\_\_\_\_

 = \_\_\_\_\_\_\_  = \_\_\_\_\_\_\_  = \_\_\_\_\_\_\_

 = \_\_\_\_\_\_\_  = \_\_\_\_\_\_\_  = \_\_\_\_\_\_\_

7.) Integrate

8.) 

9.) 

10.) Integrate using trigonometric substitution 

11.) Integrate using trigonometric substitution 

12.) First, use long division to create a polynomial and rational remainder, then use a CAS SYSTEM to find the partial fraction from the rational remainder, then integrate the polynomial and partial fractional result. 

Partial fraction 🡺 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

13.) Identify *u, du, dv,* *v* and write the formula that would be used to complete the integration.

Do not integrate: 

u = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ du = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dv = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ v = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

14.) Identify u, du, dv, v and write the formula, then integrate: 

 Hint: you will have to repeat the process twice.

u = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ du = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

dv = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ v = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

15.)  In a right triangle, if angle A is 30°, what are the measures of sides a, b, c ?

16.)  A rectangular Solar Panel measures 20 ft. by 30 ft. If you add the same amount to each

dimension, the area is doubled. What is the amount added to each dimension?

17.) Given that a = b

*Multiply both sides by a* a·a = b·a

 *Then* a2 = a·b

 Subtracting b2 from both sides a2 – b2 = a·b – b2

 *Factoring* (a + b)(a – b) = b(a – b)

*Cancelling (a – b):*  (a + b) = b

*Since a = b* (a + a) = a

 2a = a

*Dividing by a* 2 = 1 How can this be?

18.) Complete the following crossword puzzle.

This puzzle has simple problems, theorems, and properties that are an integral part (no pun intended) of calculus. A few words on notation.

3x^2 = threexsquared 3 = three 0 = zero sin x = sinx sin 2x = sintwox

sin^2 x = sinsquaredx 1/x = oneoverx 1/(x-1) = oneoverxminus1 infinity = infinity

NOTE: For all indefinite integrals, forget about the + C. NOTE: For all true/false questions, use the given affirmative or negative answer provided (i.e., True/False, Yeah/Nope, Yay/Nay).

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| **Across** |
| 3. | The slope of the tangent line is also known as this. |
| 6. | Find the antiderivative: y = 0 |
| 7. | Yes/No: the derivative of the integral of f(x) is simply f(x). |
| 9. | (b-a)/2n[f(x0) + 2f(x1) + 2f(x2)...+ f(xn)] is the general formula for which rule? |
| 11. | Find dy/dx: y= 4x^3 |
| 13. | The derivative represents the average \_\_\_\_\_ of change. |
| 14. | Functions that either increase or decrease along its entire domain are called \_\_\_\_\_. |
| 20. | The second derivative of position is this. |
| 21. | True/False: Rolles Theorum states that the integral of f(x) is equal to the area of f(x) along a specified interval. |
| 22. | Yeah/Nope: The trapezoidal rule is the exact value for the area under the curve. |
| 23. | Aff/Neg: The limit definition to find area using "n" subintervals, as n approaches infinity, is an accurate measure of the area under the curve on a specified interval. |
| 24. | If the second derivative is positive along that interval, the graph of the function is always this. |
| 26. | Find dy/dx: y = 900000000000000 |
| 27. | The horizontal asymptote of f(x) is the limit as x approaches what value? |

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| **Down** |
| 1. | You are given dy/dx: What test do you use to find increasing and decreasing intervals of f(x)? |
| 2. | Aff/Neg: Reimann sums measure the slope of the tangent line. |
| 4. | The Integral of a function is equal to its \_\_\_\_\_\_\_ + C. |
| 5. | When the first derivative is negative at the left of the critical point and positive at the right of the critical point, the critical point is a relative \_\_\_\_\_. |
| 8. | Find dy/dx: ln x |
| 10. | A function is not continous if its left hand limit does not \_\_\_\_\_ its right hand limit. |
| 12. | Find the antiderivative: y = 1 |
| 15. | Find the area under the curve y = 3x^2 on the interval [-1,1] |
| 16. | Yeah/Nope: not every function has an inverse. |
| 17. | Find dy/dx: y = 3 |
| 18. | The antiderivative of cos (3x) is this. |
| 19. | The area under the curve for f(x) is found by using this process. |
| 22. | Yay/Nay: The mean value theorum states that only monotonic functions have an inverse. |
| 25. | If the second derivative is zero, the second derivative test \_\_\_\_\_. |
| 26. | Find d^2y/dx: y = 3x |
| 28. | True/False: the derivative of position is velocity. |

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Top of Form

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