1	2	3	4	5	6	7	8	9	10	11	Spring 2019

DO NOT WRITE IN THESE BLOCKS

NAME____ MTH 1322 - CALCULUS II

INSTRUCTOR____

DIRECTIONS: You must show enough of your work so that the reader can follow what you did.

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1. (a) Use integration by parts to evaluate $\int xe^{-x}\,dx$.

   (b) Evaluate the improper integral $\int_1^{\infty} xe^{-x}\,dx$.

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2. Use a trigonometric substitution to evaluate $\int \sqrt{4-x^2}\,dx$.

3. Use a partial fraction decomposition to evaluate $\displaystyle\int \frac{x-4}{x^2+x-2}\,dx$.

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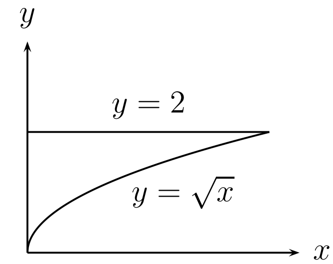
4. Use a comparison test to determine if the improper integral converges or diverges.

(a) $\displaystyle\int_1^\infty \frac{dx}{x+\sqrt{x}}$

(b) $\displaystyle\int_0^1 \frac{dx}{x+\sqrt{x}}$

5. The figure below shows the region bounded by the graph $y = \sqrt{x}$, the line $y = 2$, and the y-axis. Find the volume of the solid obtained by rotating the region about the given axis.

(a) x-axis



(b) y-axis

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6. Solve the initial value problem $\dfrac{dy}{dx} = -y^2, \quad y(0) = 2.$

7. Find the sum of the series or state (with justification) that the series diverges.

(a) $\sum_{n=1}^{\infty} \frac{1}{3^n}$

(b) $\sum_{n=1}^{\infty} \frac{n}{2n+1}$

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8. Determine whether the series $\sum_{n=2}^{\infty} (-1)^n \frac{1}{n \ln n}$ converges absolutely, conditionally, or not at all.

(Clearly state which tests you are using and show all the work that the tests require.)

9. Find the interval of convergence of the power series. (Pay attention to endpoints.)

(a) $\sum_{n=1}^{\infty} nx^n$

(b) $\sum_{n=0}^{\infty} \frac{x^n}{(2n)!}$

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10. Find the Maclaurin series of $\tan^{-1}(x)$ by integrating the Maclaurin series of $\frac{1}{1+x^2}$.

11. Write the complex number in the form $a + bi$.

(a) $e^{3\pi i/4}$

(b) $\left(\frac{1}{2} + \frac{\sqrt{3}}{2}i\right)^9$

Table of Trigonometric Integrals

$$\int \tan x\,dx = \ln|\sec x| + C = -\ln|\cos x| + C$$

$$\int \cot x\,dx = -\ln|\csc x| + C = \ln|\sin x| + C$$

$$\int \sec x\,dx = \ln|\sec x + \tan x| + C$$

$$\int \csc x\,dx = -\ln|\csc x + \cot x| + C$$

$$\int \sin^n x\,dx = -\frac{1}{n}\sin^{n-1} x\cos x + \frac{n-1}{n}\int \sin^{n-2} x\,dx$$

$$\int \cos^n x\,dx = \frac{1}{n}\cos^{n-1} x\sin x + \frac{n-1}{n}\int \cos^{n-2} x\,dx$$

$$\int \tan^n x\,dx = \frac{1}{n-1}\tan^{n-1} x - \int \tan^{n-2} x\,dx$$

$$\int \cot^n x\,dx = -\frac{1}{n-1}\cot^{n-1} x - \int \cot^{n-2} x\,dx$$

$$\int \sec^n x\,dx = \frac{1}{n-1}\sec^{n-2} x\tan x + \frac{n-2}{n-1}\int \sec^{n-2} x\,dx$$

$$\int \csc^n x\,dx = -\frac{1}{n-1}\csc^{n-2} x\cot x + \frac{n-2}{n-1}\int \csc^{n-2} x\,dx$$