\[ \frac{1}{2} \int_1^9 \frac{1}{\sqrt{x}(1+\sqrt{x})^2} \, dx \]

Let \( u = 1 + \sqrt{x} \)
\[ u = 1 + x^{\frac{1}{2}} \]
\[ du = \frac{1}{2} x^{-\frac{1}{2}} \, dx \]
\[ 2 \, du = \frac{1}{\sqrt{x}} \, dx \]

\( x = 1, u = 2 \)
\( x = 9, u = 4 \)

\( \text{fnInt}(Y_1, x, 1, 9) = 0.5 \)

\[ Y_1 \equiv 1/\sqrt{x} \times (1+\sqrt{x})^2 \]

Title: Dec 5 - 8:19 AM (1 of 12)
\[
\int \tan^4 x \sec^2 x \, dx
\]

Let \( u = \tan x \),

Then \( du = \sec^2 x \, dx \)

\[
\int u^4 \, du = \frac{u^5}{5} + C
\]

\[\frac{1}{5} \tan^5 x + C\]
\[ \int \tan^3 x \sec^3 x \, dx \]

Let \( u = \tan x \)
\[ du = \sec^2 x \, dx \]

Let \( u = \sec x \)
\[ du = \sec x \tan x \, dx \]

\[ \int \tan^2 x \sec^2 x \left( \frac{\tan x \sec x \, dx}{\sec x \tan x} \right) = \]

\[ \int (\sec^2 x - 1) \sec^2 x \left( \frac{\sec x \tan x \, dx}{\sec x \tan x} \right) = \]

\[ \int (u^2 - 1) \, du = \]

\[ \int (u^4 - u^2) \, du = \]

\[ \frac{u^5}{5} - \frac{u^3}{3} + C = \]

\[ \frac{1}{5} \sec^5 x - \frac{1}{3} \sec^3 x + C \]
Area between curves

\[ y = f(x) \]

Geometrically, interpretation of

\[ \int_{a}^{b} f(x) \, dx \text{ if } f(x) \geq 0 \text{ on } [a, b] \]

Answer: Area under \( y = f(x) \), above the x-axis and between \( x = a \), \( x = b \)
Find the area between the curves:

\[
\int_a^b f(x) \, dx - \int_a^b g(x) \, dx = \text{Area between}
\]

If \( f \) and \( g \) are continuous on \([a, b]\) and \( g(x) \leq f(x) \) for all \( x \) in \([a, b]\), then the area between \( y = f(x) \) and \( y = g(x) \) and between \( x = a \) and \( x = b \) is

\[
\int_a^b (f(x) - g(x)) \, dx
\]
Graph the following function:

\[ f(x) = x^3 - x^2 + 1 \]

Find the value of the function at the following points:

1. \( f(0) \)
2. \( f(1) \)
3. \( f(-1) \)

Evaluate the following expressions:

1. \( y = 2x + 3 \)
2. \( y = x^2 - 3x + 1 \)
3. \( y = \frac{x}{x+1} \)

For the given function, find:

1. The limit as \( x \) approaches 0.
2. The derivative at \( x = 2 \).
3. The area under the curve from \( x = 1 \) to \( x = 3 \).
\[ A = \int_0^3 \frac{1}{2} [(x^2 + 4x + 1) - (x + 1)] \, dx \]
\[ A = \int_0^3 (x^2 + 4x + 1 - x - 1) \, dx \]
\[ A = \int_0^3 (x^2 + 3x) \, dx \]
\[ A = \left. \left( \frac{x^3}{3} + \frac{3x^2}{2} \right) \right|_0^3 \]
\[ A = \left( -\frac{9}{2} + \frac{27}{2} \right) - \left( 0 + 0 \right) \]
\[ A = \frac{18}{2} = 9 \text{ square units} \]
Area between the 2 curves is
\[ \int_{a}^{c} (f(x) - g(x)) \, dx + \int_{c}^{b} (g(x) - f(x)) \, dx \]
\[
\int_{a}^{b} (\text{top bow} - \text{Bottom})\,dx + \int_{b}^{c} (\text{line} - \text{bottom保罗})\,dx
\]
\[ f(y) = y(2-y) \quad g(y) = -y \]

Here \( x \) is a function of \( y \)
\[ x = 2y - y^2 \quad x = -y \]

Points of intersection:
\[ 2y - y^2 = -y \]

First:
\[ 0 = y^2 - 3y \]
\[ 0 = y(y-3) \]
\[ y = 0 \quad y = 3 \]

\[ x = 2y - y^2 \]
\[ x = -y \]

\[ \begin{array}{c|c|c}
   y & x \\
   \hline
   0 & 0 & 0 \\
   -3 & 3 & 10 \\
   1 & 1 & -2 \\
   2 & 2 & 0 \\
   3 & 3 & -3 \\
\end{array} \]
Area of a horizontal rectangle:
\[ \text{Area} = \text{length} \times \text{height} \]
\[ (x_{\text{right}} - x_{\text{left}}) \times \text{height} \]
\[ \left( \frac{y_1}{y_2} \right) \text{ dy} \]

Area between curves:
\[ A = \int_{y_1}^{y_2} (f(y) - g(y)) \text{ dy} \]
\[ \int_{0}^{3} [(2y - y^2) - (-y)] \text{ dy} \]
\[ \int_{0}^{3} (2y - y^2 + y) \text{ dy} \]
\[ \left[ -\frac{y^3}{3} + \frac{3y^2}{2} - \frac{y^3}{2} \right]_0^3 \]
\[ (9 + 22) - (0) = \]
\[ \frac{18 + 22}{2} = \frac{9}{2} = 4.5 \]
Wed

7.1 Do those assigned

4.4, 4.5 Trig/Trig Calc
Read 4.6 Num/Int.

Test 4 Friday Ch 4, 7, 1

3, 8, 3, 9