CALCULUS: Graphical, Numerical, Algebraic by Finney, Demana, Watts and Kennedy Chapter 5: The Definite Integral 5.2: Definite Integrals pg. 274-284

What you'll Learn About

- Terminology and Notation of Integration
- The Definite Integral
- Area under a curve using geometry
- Properties of Definite Integrals

Evaluate the definite integral using geometry


It is called a dummy variable because the answer does not depend on the variable chosen. $\rightarrow$
8) $\int_{3}^{7}-20 d x$ 8A) $\int_{2}^{7} 22 d x$
14) $\int_{.5}^{1.5}(-2 x+4) d x$
16) $\int_{-4}^{0} \sqrt{16-x^{2}} d x$



CALCULUS: Graphical, Numerical, Algebraic by Finney, Demana, Watts and Kennedy Chapter 5: The Definite Integral 5.3-5.4: Definite Integrals and Antiderivatives pg. 285-305


| $30 a) \int_{1}^{2} \frac{1}{x^{3}} d x=$ | $30) \int_{0}^{5} x^{3 / 2} d x=$ |
| :--- | :--- | :--- |
| $34) \int_{0}^{\pi}(1+\cos x) d x=$ | $40) \int_{0}^{4} \frac{1-\sqrt{x}}{\sqrt{x}} d x=$ |
|  |  |

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| $39 a) \int_{0}^{1}(1+x)^{3} d x=$ | $39 a) \int_{0}^{1}(1+x)^{3} d x=$ |
| :--- | :--- | :--- |
|  |  |
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Chapter 5: The Definite Integral 5.4: Fundamental Theorem of Calculus pg. 294-305 What you'll Learn About

- Analyzing antiderivatives graphically
- Connecting Antiderivatives to Area
- Taking the derivative of an integral
$\begin{array}{ll}\text { A) Find } \frac{\mathrm{d}}{\mathrm{dx}} \int_{1}^{x}(\cos t) d t & \text { B) Find } \frac{\mathrm{d}}{\mathrm{dx}} \int_{1}^{x^{3}}(\cos t) d t\end{array}$
C) Find $\frac{\mathrm{d}}{\mathrm{dx}} \int_{x^{3}}^{x^{2}}(\cos t) d t$

| Find $\frac{\mathrm{dy}}{\mathrm{dx}}$ for the given function |  |
| :--- | :--- | :--- |
| 2) $\mathrm{y}=\int_{2}^{x}\left(3 t+\cos t^{2}\right) d t$ | $10) \mathrm{y}=\int_{6}^{x^{2}}(\cot (3 t)) d t$ |
|  |  |
| $12) \mathrm{y}=\int_{\pi}^{\pi-x}\left(\frac{1+\sin ^{2} t}{1+\cos ^{2} t}\right) d t$ |  |
| $20) \mathrm{y}^{2}=\int_{\sin x}^{\cos x}\left(t^{2}\right) d t$ |  |


9. Find the equation of the tangent line to the graph of $g$ at $x=-2$
$\mathbf{1 3} \mid \mathrm{P}$ a g e
(11. Let $\mathrm{h}(\mathrm{x})=\mathrm{g}(\mathrm{x})-.5 \mathrm{x}^{2}-\mathrm{x}$. Determine the critical values of $\mathrm{h}(\mathrm{x}) \mathrm{on}$



$\mathbf{1 6 | P a g e}$

What you'll Learn About

- How to find the area under the curve using rectangles and trapezoids
- What Right Riemann Sums, Left Riemann Sums, Midpoint Riemann Sums and Trapezoidal Sums are

1. Use the data below and 4 sub-intervals to approximate the area under the curve using Right Riemann Sums.

| t | 0 | 2 | 5 | 9 | 10 |
| :--- | :--- | :--- | :--- | :--- | :--- |
| $\mathrm{H}(\mathrm{t})$ | 66 | 60 | 52 | 44 | 43 |

1. Use the data below and 4 sub-intervals to approximate the area under the curve using Left Riemann Sums

| t | 0 | 2 | 5 | 9 | 10 |
| :--- | :--- | :--- | :--- | :--- | :--- |
| $\mathrm{H}(\mathrm{t})$ | 66 | 60 | 52 | 44 | 43 |

5. Use the data below to approximate the area under the curve using Right Riemann Sums and Left Riemann Sums with 5 sub-intervals.

| T | 0 | 8 | 20 | 25 | 32 | 40 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $\mathrm{P}(\mathrm{t})$ | 3 | 5 | -10 | -8 | -4 | 7 |



18 |P a g e
4. Use the data below to approximate the area under the curve using Midpoint Riemann Sums with 3 sub-intervals.

| T | 0 | 2 | 4 | 6 | 8 | 10 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $\mathrm{P}(\mathrm{t})$ | 0 | 46 | 53 | 57 | 60 | 62 |

13. Use the data below to approximate the area under the curve using a midpoint Riemann sum with 3 sub-intervals

| $\mathrm{T}(\mathrm{sec})$ | 0 | 60 | 120 | 180 | 240 | 300 | 360 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $\mathrm{a}(\mathrm{t})$ <br> $\mathrm{ft} / \mathrm{sec}^{2}$ | 24 | 30 | 28 | 30 | 26 | 24 | 26 |


|  | t (minutes) 0 4 9 15 20 |
| :---: | :---: |
|  | $\mathrm{W}(\mathrm{t})$ <br> degrees F 55.0 57.1 61.8 67.9 71.0 |
|  | 2012 \#1 <br> The temperature of water in a tub at time $t$ is modeled by a strictly increasing, twice differentiable function, W , where $\mathrm{W}(\mathrm{t})$ is measured in degrees Fahrenheit and t is measured in minutes. At time $t=0$, the temperature of the water is $55^{\circ} \mathrm{F}$. The water is heated for 30 minutes, beginning at time $t=0$. Values of $\mathrm{W}(\mathrm{t})$ at selected times t for the first 20 minutes are given in the table above. <br> c) For $0 \leq t \leq 20$, the average temperature of the water in the tub is $\frac{1}{20} \int_{0}^{20} W(t) d t$. Use a left Riemann sum with four subintervals indicated by the data in the table to approximate $\frac{1}{20} \int_{0}^{20} W(t) d t$. Does this approximation overestimate or underestimate the average temperature of the water over these 20 minutes? Explain your reasoning. |




