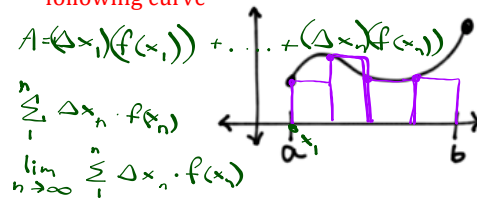


Calculus 5.2 notes- Definite Integrals

Consider using any RAM to approximate the area under the following curve



In general, what is the area of each rectangle?

What is the sum of all rectangles?

How could we find the exact area?

There must be a better way to write this! *upper bound*

$\int_a^b f(x) dx$ *function* *variable*

The integral: *anti-derivative* *lower bound*

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About the Integral:

1. All continuous functions over $[a,b]$ are integrable.

2. The area under the curve if $f(x) > 0$ is $\int_a^b f(x) dx$

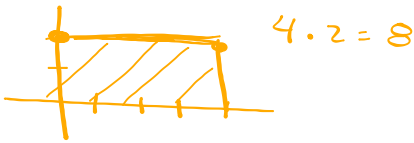
3. The area under a curve if $f(x) < 0$ is $-\int_a^b f(x) dx$

4. $\int_a^b f(x) dx = (\text{Area above x-axis}) - (\text{Area below x-axis})$

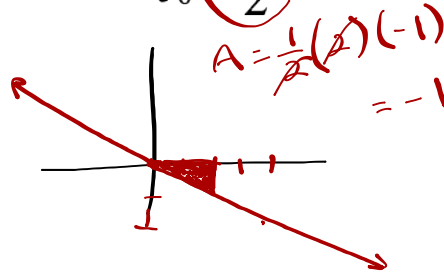
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Evaluate each integral using areas

1. $\int_0^4 2 dx$

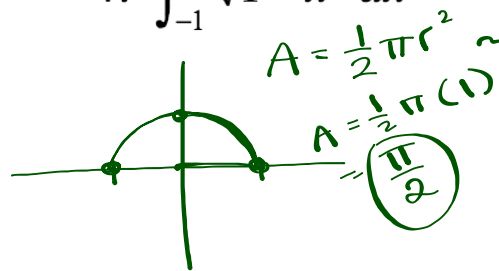


2. $\int_0^2 \left(-\frac{1}{2}x\right) dx$



3. $\int_0^4 (2x-1) dx$

4. $\int_{-1}^1 \sqrt{1-x^2} dx$

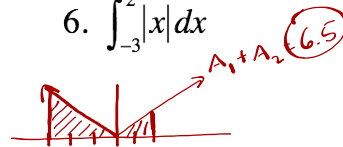


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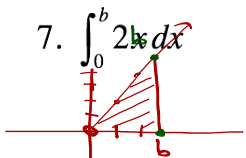
Evaluate each integral using areas.

5. $\int_2^4 x dx$

6. $\int_{-3}^2 |x| dx$

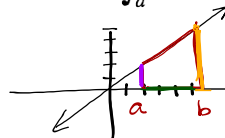


$A_1 = \frac{1}{2}(3)(3) = 4.5$
 $A_2 = \frac{1}{2}(2)(2) = 2$



$A = \frac{1}{2}bh$
 $A = \frac{1}{2}b(2b) = b^2$

8. $\int_a^b x dx$



Trap = $\frac{b_1 + b_2}{2} \cdot h$
 $= \frac{(a + b)}{2} (b - a)$
 $= \frac{ab - a^2 + b^2 - ab}{2}$

$A = \frac{b^2 - a^2}{2}$

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Evaluate each integral using your calculator

$$9. \int_{-1}^3 x^2 dx$$

$$10. \int_0^{\pi} \sin x dx$$

$$11. \int_{-3}^3 (9 - x^2) dx$$

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