

Basic Integration Review Chapter 8

Use the Fundamental Theorem of Calculus to find the area under the curve.

#1) $f(x) = \frac{\tan(x)\cos(x)}{\sin(x)}$ from $x = 4$ to $x = 10$

#2) $f(x) = x$ from $x = 0$ to $x = 4$

#3) $f(x) = e^x$ from $x = 0$ to $x = 1$

#4) $f(x) = 9 - 3\sqrt{x}$ from $x = 0$ to $x = 9$.

#5) $f(x) = \frac{1}{x}$ from $x = e$ to $x = e^3$.

#6) $\int_0^1 (6x^2 - 4e^{2x}) dx$

#7) $\int_1^2 \frac{(x+1)^2}{x^2} dx$

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#8) An average child of age x years gains weight at the rate of $3.9x^{1/2}$ pounds per year (for the first 16 years). Find the total weight gain from age 1 to age 9.

#9) A company's marginal cost function is $MC(x) = 8e^{-0.01x}$, where x is the number of units. Find the total cost of the first hundred units. ($x = 0$ to $x = 100$).

#10) There are approximately $2.3e^{0.01t}$ million marriages per year in the United States, where t is the number of years since 1995. Assuming that this rate continues, find the average number of marriages from the year 1995 to the year 2005.

#11) What is the difference between an indefinite integral and a definite integral?

#12) Explain in words what the answer to this

problem means. $\int_3^7 x^2 dx$

(note: you do not need to actually solve this problem.)

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#13) Find the area bounded by the curves.
 $y = 4x^3$ and $y = 12x^2 - 8x$

#14) Find the area bounded by the curves.
 $y = x^3 + x^2$ and $y = x^2 + x$

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$$\#1: \int_4^{10} \left[\frac{\tan(x) \cos(x)}{\sin(x)} \right] dx = 6 \text{ un}^2$$

$$\#2: \int_0^4 x dx = 8 \text{ un}^2$$

$$\#3: \int_0^1 e^x dx = (e - 1) \text{ un}^2$$

$$\#4: \int_0^9 (9 - 3\sqrt{x}) dx = 27 \text{ un}^2$$

$$\#5: \int_e^{e^3} \frac{1}{x} dx = 2 \text{ un}^2$$

$$\#6: \int_0^1 (6x^2 - 4e^{2x}) dx = (4 - 2e^2) \text{ un}^2$$

#7:

$$\int_1^2 \frac{(x+1)^2}{x^2} dx = (1.5 + 2 \ln 2) \text{ un}^2 \approx 2.89 \text{ un}^2$$

#8: The total weight gain of a child from age 1 to age 9 is about 68 pounds.

#9: The total cost of the making the first one hundred units is about \$505.70.

#10: The average number of marriages from the year 1995 to the year 2005 is about 2.4.9 million. (2,419,000 marriages).

#11: An indefinite integral results in the original function only (the arbitrary constant attached to the answer).

A definite integral results in a specific number because the original function is then evaluated at the upper and lower limits and then subtracted. The result is the area under the curve between the two limits. (The arbitrary constant is left out because it will cancel anyhow due to the subtraction in the formula.)

#12: "The area under the curve x^2 between $x = 3$ and $x = 7$."

$$\#13: 2 \text{ un}^2$$

$$\#14: \frac{1}{2} \text{ un}^2$$