Precalc15.4

FTC = F

Use the fundamental theorem of calculus to evaluate definite integrals

Find indefinite integrals $+ C \qquad \int (\ )\,dx$

definite integral $\int_3^5 (\ )\,dx$

indefinite integral $F\Big|_3^5$

Fundamental Theorem of Calculus	If $F(x)$ is the antiderivative of the continuous function $f(x)$, then $$\int_a^b f(x)\,dx = F(b) - F(a).$$

$$\int_a^b f(x)\,dx = F(x)\Big|_a^b = F(b) - F(a)$$

39. $\int_{-2}^{5} (x^2 - 3x + 8)\, dx$

$$\frac{x^3}{3} - 3 \cdot \frac{x^2}{2} + 8x \Big|_{-2}^{5}$$

$$\left(\frac{125}{3} - \frac{75}{2} + 40\right) - \left(-\frac{8}{3} - \frac{12}{2} + -16\right)$$

$$=$$

How is this one different?

41. $\int_2^3 (x-1)^3\,dx$

$$\int_2^3 1x^3 + 3x^2(-1) + 3x(-1)^2 + 1(-1)^3$$

$$\int_2^3 x^3 + 3x^2 + 3x - 1$$

$$\frac{x^4}{4} + \frac{3x^3}{3} + 3\frac{x^2}{2} - 1x \Big|_2^3$$

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42. $\int_0^1 \frac{x^2 - x - 2}{x - 2}\, dx$

(Simplify: does it factor?)

$$\int_0^1 \frac{(x+1)(x-2)}{x-2}$$

$$\int_0^1 x+1$$

$$\frac{x^2}{2} + x \Big|_0^1$$

$$\left(\quad\right) - \left(\quad\right)$$