Section 6.1 The Indefinite Integral AKA: Anti-derivative

$\int$ = this means you have to undo derivative

$\int x^n dx$ = how it normally looks

Prior: multiply ⇒ Subtract
Now: add ⇒ Divide ← by new exponent

Ex: $\int x^n dx = \frac{x^{n+1}}{n+1} + C$

Ex: $\int x^3 dx = \frac{x^4}{4} + C$

Ex: $\int 3x^5 dx = \frac{3x^6}{6} + C = \frac{x^6}{2} + C$

Can re-check using derivative rules of multiply ⇒ subtract to confirm.

Ex: $\int (5x^2 - 3x + 7)\, dx = \frac{5x^3}{3} - \frac{3x^2}{2} + 7x + C$

Ex: $\int (x+2)(x-7)\, dx$ 1st step FOIL IT - MAKE ALGEBRA EASY.

Section 6.3 Definite Integral

$$\int_2^7 x^2\,dx = \frac{x^3}{3}\Big|_2^7 = \frac{7^3}{3} - \frac{2^3}{3} = 114.33 - 2.67 = \frac{343}{3} - \frac{8}{3}$$

$$= \frac{335}{3} \text{ or } 111.67$$

$x=7$ ← what this means

$x=2$ ← what this means

Ex: $\iiint_a dx\,dy\,dz = \int dx \int dy \int dz$

NOTE: $\int_a^b f(x)\,dx = F(b) - F(a)$

Fundamental Theorem of Calculus

Example: $\int_0^4 (x^2 - 3x)\,dx = \frac{x^3}{3} - \frac{3x^2}{2}\Big|_0^4$

, so $\Big|_{x=\emptyset}^{x=4}$

$$\frac{4^3}{3} - \frac{3(4)^2}{2} - \cancel{\frac{\emptyset^2}{3}}^{\emptyset} \cancel{\frac{3(0)^2}{2}} = \frac{64}{3} - \frac{48}{2}\overset{\emptyset}{} =$$

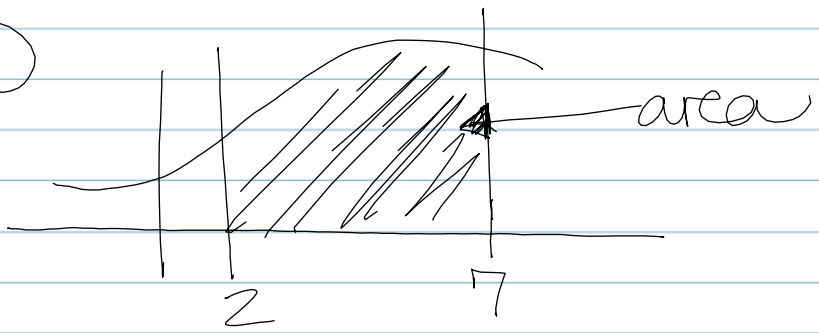
$$21.333 - 24 = \boxed{-2.667}$$

Hint: If you have $\int_\emptyset^4$ then your answer will be a #.

Section 6.4

Hint: If $\int$ has no # will end with an equation.

Ex:



Ex:

$5 - 8 = -3$

whereas 13 units (8 & 5) have been covered.