Summary of 5-3

Ex 1) If $\int_3^7 f(x)dx = 5$ and $\int_3^7 g(x)\,dx = 3$, then all of the following must be true except

a) $\int_3^7 f(x)g(x) = 15$ False

b) $\int_3^7 (f(x) + g(x))\,dx = 8$ $5+3=8$ True

c) $\int_3^7 2f(x)\,dx = 10$ $2\cdot 5=10$ True

d) $\int_3^7 (f(x) - g(x))dx = 2$ $5-3=2$ True

e) $\int_7^3 (g(x) - f(x))\,dx = 2$

$-\int_3^7 (g(x)-f(x))dx = -(3-5) = -(-2) = 2$ True

Evaluate the **integral** using the **antiderivative.** $\int x^r = \frac{x^{r+1}}{r+1}$

Ex 2) $\int_0^{\frac{\pi}{2}} \sin x \, dx$

$$-\cos x \Big|_0^{\pi/2}$$

$$-\cos\frac{\pi}{2} - (-\cos 0))$$

$$-0 + 1$$

$$1$$

Ex 2) $\int_2^1 (4x^2 + 2x) \, dx$

$$= -\int_1^2 (4x^2+2x)dx$$

$$= -\left(\frac{4}{3}x^3 + x^2\right)\Big|_1^2$$

$$-\left(\frac{4}{3}(2)^3 + 2^2\right) + \left(+\left(\frac{4}{3}(1)^3 + 1^2\right)\right)$$

$$-\left(\frac{32}{3} + \frac{4 \cdot 3}{\cdot 3}\right) + \left(\frac{4}{3} + 1\right)$$

$$-\frac{44}{3} + \frac{7}{3} = \frac{-37}{3}$$

Find the **average value** of the function on the interval, using antiderivatives to compute the integral.

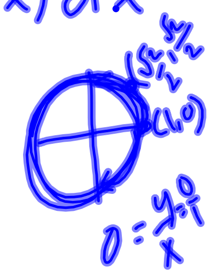
Ex 4) $y = \frac{1}{1+x^2}$ $\quad [\underset{a}{0}, \underset{b}{1}]$

$$\frac{1}{b-a}\int_a^b f(x)\,dx$$

$$\frac{1}{1-0}\int_0^1 \frac{1}{1+x^2}\,dx$$

$\frac{y}{x}$

$\tan\theta = 1$



$$= \tan^{-1} x \Big|_0^1 = \tan^{-1}(1) - \tan^{-1}(0)$$

$$\frac{\pi}{4} - 0 = \pi/4$$

Find the **average value** of the function on the interval, using antiderivatives to compute the integral.

Ex 4) $y = \dfrac{1}{1 + x^2}$ $\left[0, 1\right]$