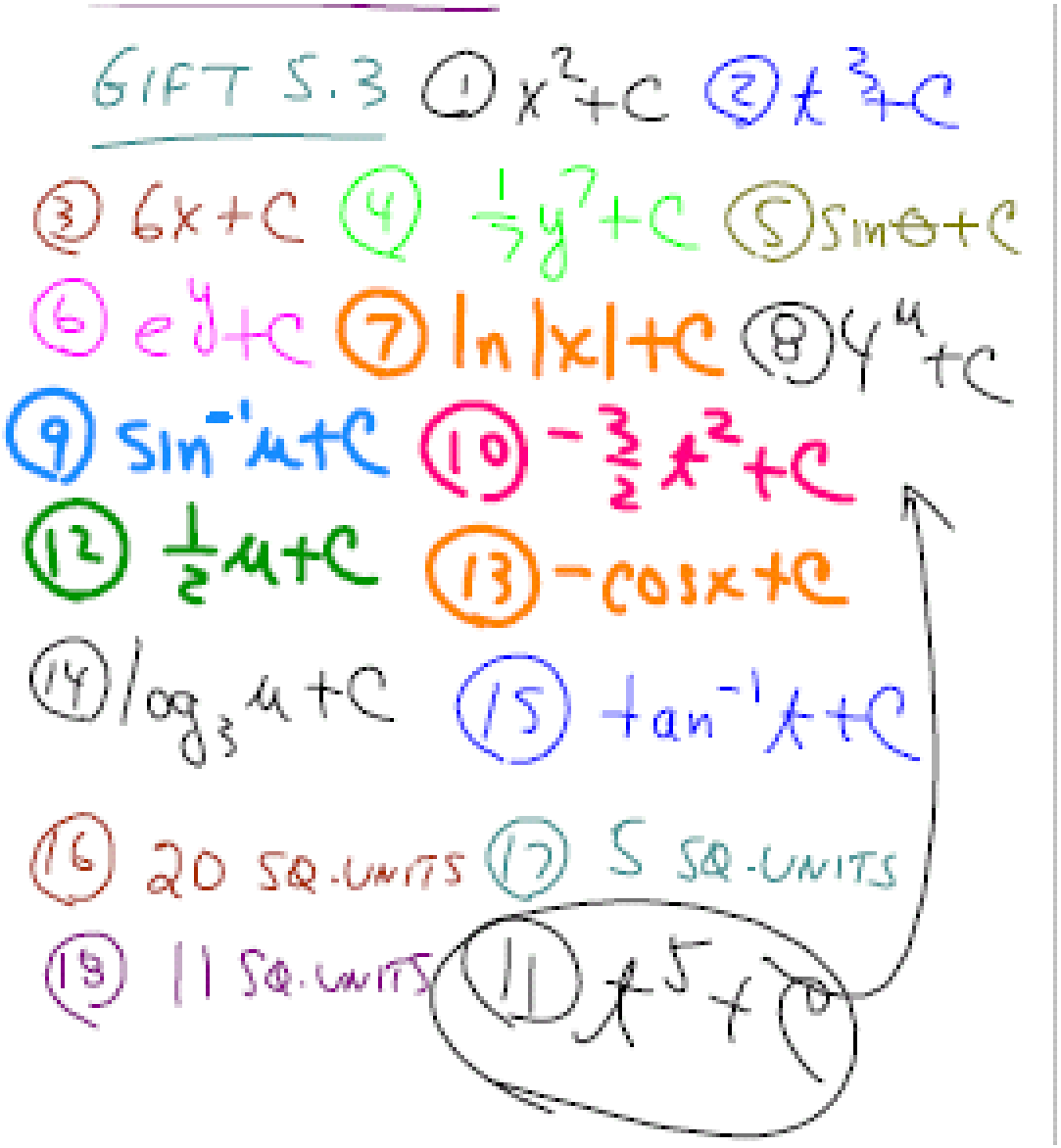
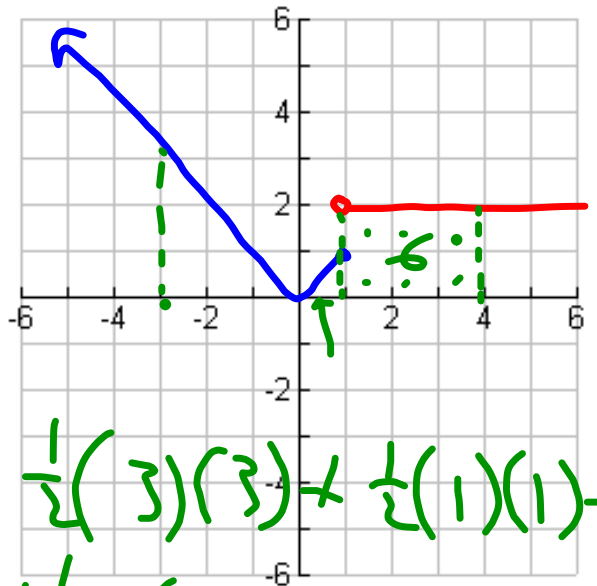
TUES 02-07-06

GIFT 5.3



(8) $f(x) = \begin{cases} |x| & x \le 1 \\ 2 & x > 1 \end{cases}$

$\int_{-3}^{4} f(x)\,dx$



$A = \frac{1}{2}(3)(3) + \frac{1}{2}(1)(1) + 2(3)$

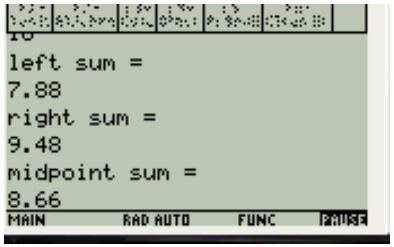
$A = \frac{9}{2} + \frac{1}{2} + 6 = 11$

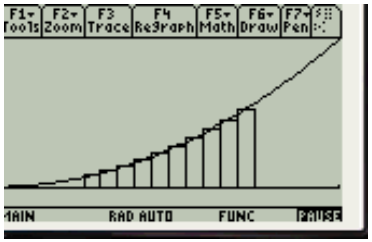
THE FUNDAMENTAL THEOREM OF INTEGRAL CALCULUS

IF f IS CONTINUOUS AT EVERY POINT IN $[a, b]$, AND F IS AN ANTI-DERIVATIVE OF f, THEN:

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

Ex) $\int_1^3 x^2\,dx$





$f(x) = x^2$

$F(x) = \frac{1}{3}x^3 + C$

$F(3) = 9 + C$

$F(1) = \frac{1}{3} + C$

$= 9 + C - \left(\frac{1}{3} + C\right)$

$= \frac{27}{3} + C - \frac{1}{3} - C$

$= \frac{26}{3}$

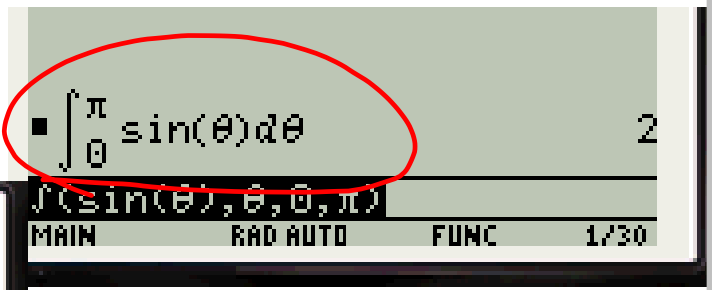
$$\text{c)} \quad \int_0^{\pi} \sin\theta \, d\theta = \Big[-\cos\theta + C \Big]_{\theta=0}^{\theta=\pi}$$

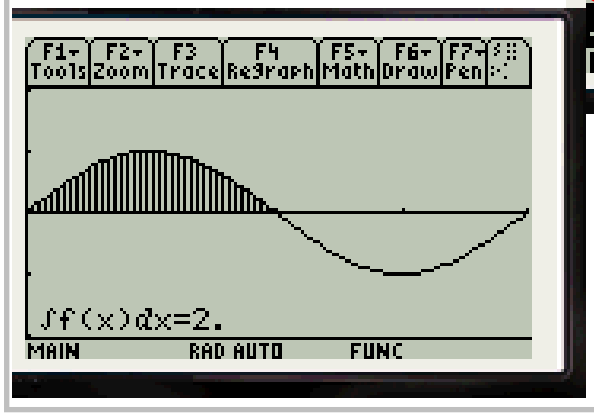
$$= \underbrace{\left[-\cos\pi + C\right]}_{F(b)} - \underbrace{\left[-\cos 0 + C\right]}_{F(a)}$$

$$= -\cos\pi + C + \cos 0 - C$$

$$= -(-1) + 1$$

$$= \underline{\underline{2}}$$





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

*EMPHASIZE PROPER FORM

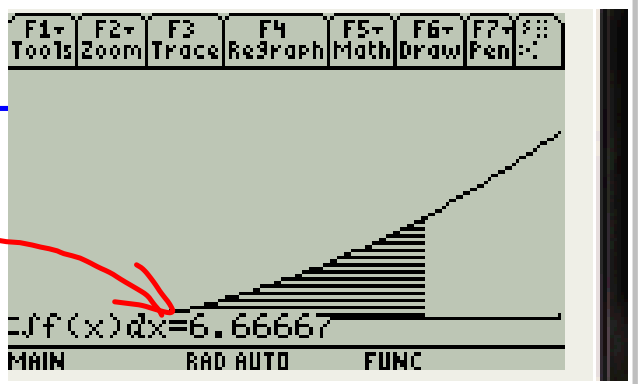
$= \left[\frac{1}{3}x^3 - x^2\right]_{x=2}^{x=4}$

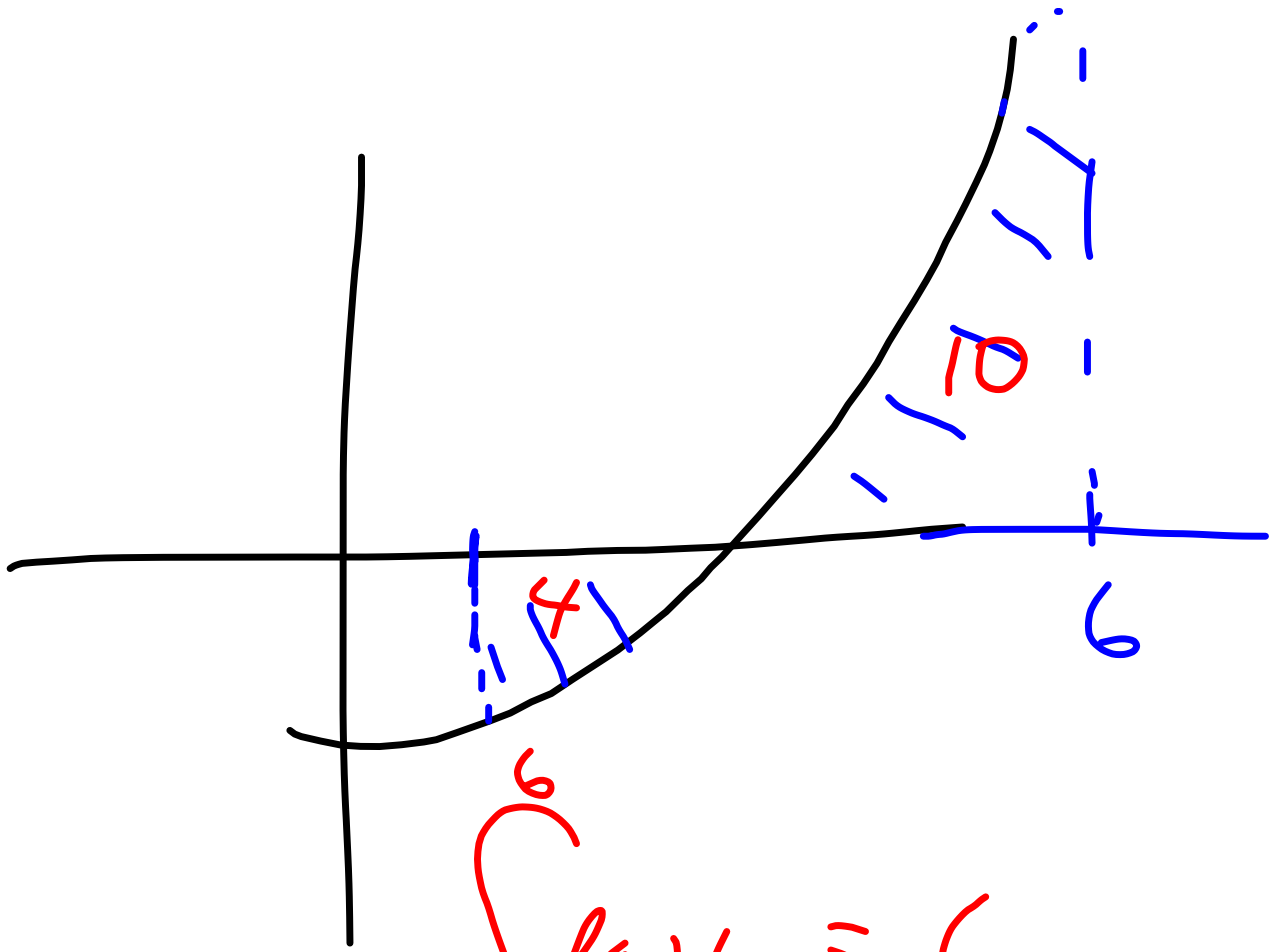
$= \left[\frac{1}{3}(4)^3 - (4)^2\right] - \left[\frac{1}{3}(2)^3 - (2)^2\right]$

$= \frac{64}{3} - \frac{48}{3} - \left[\frac{8}{3} - \frac{12}{3}\right]$

$= \frac{64 - 48 - 8 + 12}{3}$

$= \frac{20}{3}$





$$\int_1^6 f(x)\,dx = 6$$

O.T.C. THIS GIFT

AP CALCULUS GIFT 5.3 (the short one)

Evaluate the definite integrals using The Fundamental Theorem of Integral Calculus. Show your work on your paper. Make a sketch for each one, shading the area that is being found. Check with your graphing calculator.

1. $\int_{2}^{5} 4\,dx$

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

3. $\int_{-2}^{3} (t^2+2)\,dt$

4. $\int_{-1}^{2} (9-x^3)\,dx$

5. $\int_{0}^{\frac{\pi}{2}} \sin\theta\,d\theta$

6. $\int_{\frac{\pi}{2}}^{\frac{3\pi}{2}} \cos t\,dt$

7. $\int_{1}^{5} \frac{1}{x}\,dx$

8. $\int_{-2}^{2} e^u\,du$

9. $\int_{0}^{\sqrt{3}} \frac{1}{1+t^2}\,dt$