

49. If  $\int_0^9 f(x) dx = 37$  and  $\int_0^9 g(x) dx = 16$ , find  $\int_0^9 [2f(x) + 3g(x)] dx$ .

$$\begin{aligned} & \int_0^9 2f(x) dx + \int_0^9 3g(x) dx \\ &= 2 \int_0^9 f(x) dx + 3 \int_0^9 g(x) dx \\ &= 2(37) + 3(16) = 122 \end{aligned}$$

47. Write as a single integral in the form  $\int_a^b f(x) dx$ :

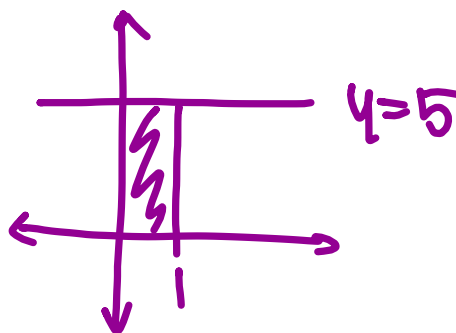
$$\underbrace{\int_{-2}^2 f(x) dx + \int_2^5 f(x) dx - \int_{-2}^{-1} f(x) dx}_{\text{red}} = \int_{-2}^5 f(x) dx - \int_{-2}^{-1} f(x) dx$$

$$= \int_{-2}^5 f(x) dx + \int_{-1}^{-2} f(x) dx = \int_{-1}^5 f(x) dx$$

$$* \int_a^b f(x) dx + \int_b^c f(x) dx = \int_a^c f(x) dx$$

43. In Example 2 in Section 5.1 we showed that  $\int_0^1 x^2 dx = \frac{1}{3}$ .  
Use this fact and the properties of integrals to evaluate  $\int_0^1 (5 - 6x^2) dx$ .

$$\begin{aligned} & \int_0^1 5 dx - \int_0^1 6x^2 dx \\ &= \int_0^1 5 dx - 6 \int_0^1 x^2 dx \\ &= 5 - 6\left(\frac{1}{3}\right) = 3 \end{aligned}$$



41. Evaluate  $\int_{\pi}^{\pi} \sin^2 x \cos^4 x dx = 0$

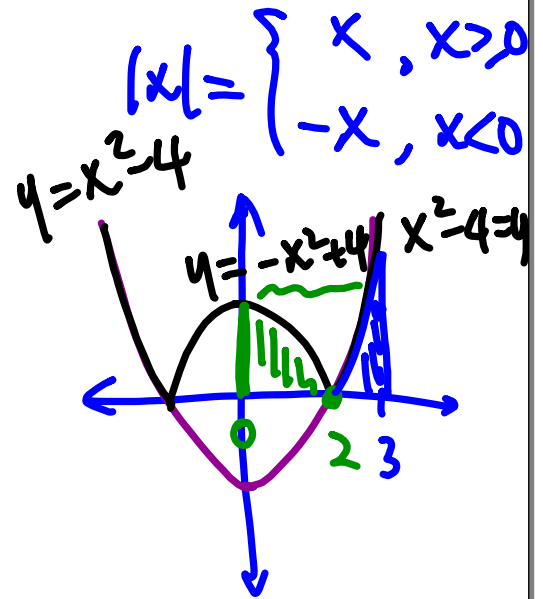
$$37. \int_0^3 |x^2 - 4| dx$$

$$\int_0^2 -x^2 + 4 dx + \int_2^3 x^2 - 4 dx$$

$$= \left[ -\frac{x^3}{3} + 4x \right]_0^2 + \left[ \frac{x^3}{3} - 4x \right]_2^3$$

$$= -\frac{8}{3} + 8 - 0 + 9 - 12 - \left( \frac{8}{3} - 8 \right)$$

$$= -\frac{16}{3} + 13 = \frac{23}{3}$$



$$\begin{aligned} 13. \int_1^9 \frac{\sqrt{u} - 2u^2}{u} du &= \int_1^9 \frac{\sqrt{u}}{u} - \frac{2u^2}{u} du = \int_1^9 \frac{1}{\sqrt{u}} - 2u du \\ &= 2\sqrt{u} - u^2 \Big|_1^9 = (6 - 81) - (1) = \boxed{-76} \end{aligned}$$

*Note: A green arrow points from the expression  $u^{-\frac{1}{2}}$  to the  $\frac{1}{\sqrt{u}}$  term in the second line of the solution.*

$$17. \int_1^5 \frac{dt}{(t-4)^2} = \int_{-3}^1 \frac{du}{u^2} = -\left. \frac{1}{u} \right|_{-3}^1 = -1 - \left(-\frac{1}{3}\right) = -\frac{4}{3}$$

$$u = t - 4$$

$$du = dt$$