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

$$\int_0^9 2f(x)\,dx + \int_0^9 3g(x)\,dx$$

$$= 2\int_0^9 f(x)\,dx + 3\int_0^9 g(x)\,dx$$

$$= 2(37) + 3(16) = 122$$

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

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

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

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

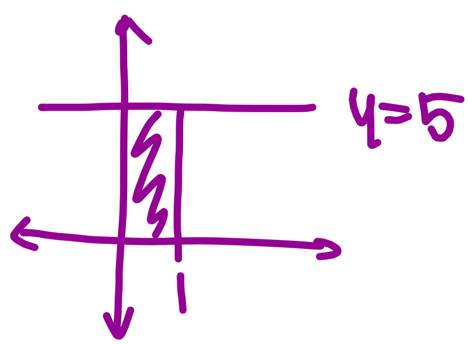
$$* \int_a^b f(x)\,dx + \int_b^c f(x)\,dx = \int_a^c f(x)\,dx$$

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 $\int_0^1 (5 - 6x^2)\,dx$.

$$\int_0^1 5\,dx - \int_0^1 6x^2\,dx$$

$$= \int_0^1 5\,dx - 6\underbrace{\int_0^1 x^2\,dx}$$

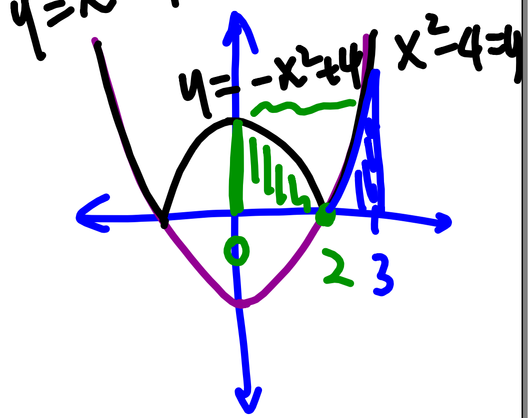
$$= 5 - 6\left(\frac{1}{3}\right) = 3$$



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

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

$$|x| = \begin{cases} x, & x>0 \\ -x, & x<0 \end{cases}$$



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

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

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

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

13. $\displaystyle\int_1^9 \frac{\sqrt{u} - 2u^2}{u}\, du$

$u^{-\frac{1}{2}}$

$$= \int_1^9 \frac{\sqrt{u}}{u} - \frac{2u^2}{u}\, du = \int_1^9 \frac{1}{\sqrt{u}} - 2u\, du$$

$$= 2\sqrt{u} - u^2 \Big]_1^9 = (6 - 81) - (1) = \boxed{-76}$$

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

$u = t-4$

$du = dt$

u^{-2}

$= -\frac{4}{3}$