

6.2 HW

39. $f(x) = x^3, [0, 4]$

$$f_{\text{avg}} = \frac{1}{4-0} \int_0^4 x^3 dx = \frac{1}{4} \left[\frac{x^4}{4} \right]_0^4 = \frac{1}{4} (64 - 0) = \textcircled{16}$$

41. $f(x) = \cos x, [0, \frac{\pi}{6}]$

$$f_{\text{avg}} = \frac{1}{\frac{\pi}{6} - 0} \int_0^{\frac{\pi}{6}} \cos x dx = \frac{6}{\pi} [\sin x]_0^{\frac{\pi}{6}} = \frac{6}{\pi} \left[\frac{1}{2} - 0 \right] = \textcircled{\frac{3}{\pi}}$$

43. $f(s) = s^{-2}, [2, 5]$

$$f_{\text{avg}} = \frac{1}{5-2} \int_2^5 s^{-2} ds = \frac{1}{3} \left[\frac{s^{-1}}{-1} \right]_2^5 = \frac{1}{3} \left[\frac{1}{s} \right]_2^5 = \frac{1}{3} \left(\frac{1}{2} - \frac{1}{5} \right) \\ = \frac{1}{3} \left(\frac{3}{10} \right) = \textcircled{\frac{1}{10}}$$

45. $f(x) = 2x^3 - 6x^2, [-1, 3]$

$$f_{\text{avg}} = \frac{1}{3 - (-1)} \int_{-1}^3 (2x^3 - 6x^2) dx = \frac{1}{4} \left[\frac{x^4}{2} - 2x^3 \right]_{-1}^3 \\ = \frac{1}{4} \left[\left(\frac{81}{2} - 54 \right) - \left(\frac{1}{2} + 2 \right) \right] = \textcircled{-4}$$

47. $f(x) = x^n, n \geq 0, [0, 1]$

$$f_{\text{avg}} = \frac{1}{1-0} \int_0^1 x^n dx = \frac{x^{n+1}}{n+1} \Big|_0^1 = \frac{1}{n+1} - 0 = \textcircled{\frac{1}{n+1}}$$