

**HW §5.1. Numbers 2,6,10,22,28**

2.  $(\ln 1 - 1) + (\ln 1.5 - 1) + (\ln 2 - 1) + (\ln 2.5 - 1) + (\ln 3 - 1) + (\ln 3.5 - 1) = -1.633722$

6 a.  $-1.5$

b.  $-0.5$

c.  $-1.25$

10.  $\sec(\pi/36) + \sec(7\pi/18) + \sec(13\pi/18) + \sec(19\pi/18) + \sec(25\pi/18) + \sec(31\pi/18) = 6.0025$

22.

$$\begin{aligned} \int_1^4 (x^2 + 2x - 5)dx &:= \lim_{n \rightarrow \infty} \sum_{i=1}^n [(1 + 3i/n)^2 + 2(1 + 3i/n) - 5](3/n) \\ &= \lim_{n \rightarrow \infty} \sum_{i=1}^n (1 + 3i/n)^2(3/n) + 2 \sum_{i=1}^n (1 + 3i/n)(3/n) - \sum_{i=1}^n 5(3/n) \\ &= \lim_{n \rightarrow \infty} \sum_{i=1}^n (1 + 6i/n + 9i^2/n^2)(3/n) + 2 \sum_{i=1}^n (1 + 3i/n)(3/n) - \sum_{i=1}^n 5(3/n) \\ &= \lim_{n \rightarrow \infty} -9 + \sum_{i=1}^n 18i/n^2 + \sum_{i=1}^n 27i^2/n^3 + 2 \sum_{i=1}^n 9i/n^2 \\ &= \lim_{n \rightarrow \infty} -9 + 18/n^2 n(n+1)/2 + 27/n^3 n(n+1)(2n+1)/6 + 18/n^2 n(n+1)/2 \\ &= -6 + 9 + 9 + 9 = 21 \end{aligned}$$

28.

$$\begin{aligned} \int_a^b x^2 dx &:= \lim_{n \rightarrow \infty} \sum_{i=1}^n \left( a + \frac{i(b-a)}{n} \right)^2 \frac{b-a}{n} \\ &= \lim_{n \rightarrow \infty} \sum_{i=1}^n \left( \frac{a^2(b-a)}{n} + \frac{2ai(b-a)^2}{n^2} + \frac{(b-a)^3}{n^3} \right) \\ &= \lim_{n \rightarrow \infty} \left[ a^2(b-a) + \frac{2a(b-a)^2}{n^2} \sum_{i=1}^n i + \frac{(b-a)^3}{n^3} \sum_{i=1}^n i^2 \right] \\ &== \lim_{n \rightarrow \infty} \left[ a^2(b-a) + \frac{2a(b-a)^2}{n^2} \frac{n(n+1)}{2} + \frac{(b-a)^3}{n^3} \frac{n(n+1)(2n+1)}{6} \right] \\ &= a^2(b-a) + a(b-a)^2 + \frac{(b-a)^3}{3} \\ &= a^2b - a^3 + a^2b_2a^2b + a^3 + b^3/3 - a^2b + ab^2 - a^3/3 \\ &= \frac{a^3 - b^3}{3} \end{aligned}$$