

## Answer Key for Examples of Today's Homework Assignment Page 267-269

$$4. \sum_{j=3}^5 \frac{1}{j} = \frac{1}{3} + \frac{1}{4} + \frac{1}{5} = \frac{47}{60}$$

$$12. \frac{2}{n} \sum_{i=1}^n \left[ 1 - \left( \frac{2i}{n} - 1 \right)^2 \right]$$

$$16. \sum_{i=1}^{15} (2i - 3) = 2 \sum_{i=1}^{15} i - 3(15) \\ = 2 \left[ \frac{15(16)}{2} \right] - 45 = 195$$

$$22. \text{sum seq}(x \text{ [ } \wedge \text{ ] } 3 - 2x, x, 1, 15, 1) = 14,160 \quad (TI-82)$$

$$\sum_{i=1}^{15} (i^3 - 2i) = \frac{(15)^2(15+1)^2}{4} - 2 \frac{15(15+1)}{2} \\ = \frac{(15)^2(16)^2}{4} - 15(16) = 14,160$$

$$24. S = [5 + 5 + 4 + 2](1) = 16$$

$$s = [4 + 4 + 2 + 0](1) = 10$$

$$\begin{aligned}
 28. S(8) &= \left(\sqrt{\frac{1}{4}} + 2\right)\frac{1}{4} + \left(\sqrt{\frac{1}{2}} + 2\right)\frac{1}{4} + \left(\sqrt{\frac{3}{4}} + 2\right)\frac{1}{4} + (\sqrt{1} + 2)\frac{1}{4} \\
 &\quad + \left(\sqrt{\frac{5}{4}} + 2\right)\frac{1}{4} + \left(\sqrt{\frac{3}{2}} + 2\right)\frac{1}{4} + \left(\sqrt{\frac{7}{4}} + 2\right)\frac{1}{4} + (\sqrt{2} + 2)\frac{1}{4} \\
 &= \frac{1}{4}\left(16 + \frac{1}{2} + \frac{\sqrt{2}}{2} + \frac{\sqrt{3}}{2} + 1 + \frac{\sqrt{5}}{2} + \frac{\sqrt{6}}{2} + \frac{\sqrt{7}}{2} + \sqrt{2}\right) \approx 6.038
 \end{aligned}$$

$$s(8) = (0 + 2)\frac{1}{4} + \left(\sqrt{\frac{1}{4}} + 2\right)\frac{1}{4} + \left(\sqrt{\frac{1}{2}} + 2\right)\frac{1}{4} + \cdots + \left(\sqrt{\frac{7}{4}} + 2\right)\frac{1}{4} \approx 5.685$$

$$34. \lim_{n \rightarrow \infty} \left[ \left( \frac{1}{n^2} \right)^{\frac{n(n+1)}{2}} \right] = \frac{1}{2} \lim_{n \rightarrow \infty} \left[ \frac{n^2 + n}{n^2} \right] = \frac{1}{2}(1) = \frac{1}{2}$$

$$36. \sum_{j=1}^n \frac{4j+3}{n^2} = \frac{1}{n^2} \sum_{j=1}^n (4j+3) = \frac{1}{n^2} \left[ \frac{4n(n+1)}{2} + 3n \right] = \frac{2n+5}{n} = S(n)$$

$$S(10) = \frac{25}{10} = 2.5$$

$$S(100) = 2.05$$

$$S(1000) = 2.005$$

$$S(10,000) = 2.0005$$

$$40. \lim_{n \rightarrow \infty} \sum_{i=1}^n \left( \frac{2i}{n} \right) \left( \frac{2}{n} \right) = \lim_{n \rightarrow \infty} \frac{4}{n^2} \sum_{i=1}^n i = \lim_{n \rightarrow \infty} \frac{4}{n^2} \left( \frac{n(n+1)}{2} \right) = \lim_{n \rightarrow \infty} \frac{4}{2} \left( 1 + \frac{1}{n} \right) = 2$$

50.  $y = x^2 + 1$  on  $[0, 3]$ . (Note:  $\Delta x = \frac{3 - 0}{n} = \frac{3}{n}$ )

$$\begin{aligned} S(n) &= \sum_{i=1}^n f\left(\frac{3i}{n}\right)\left(\frac{3}{n}\right) = \sum_{i=1}^n \left[ \left(\frac{3i}{n}\right)^2 + 1 \right] \left(\frac{3}{n}\right) \\ &= \frac{27}{n^3} \sum_{i=1}^n i^2 + \frac{3}{n} \sum_{i=1}^n 1 \\ &= \frac{27}{n^3} \frac{n(n+1)(2n+1)}{6} + \frac{3}{n}(n) = \frac{9}{2} \frac{2n^2 + 3n + 1}{n^2} + 3 \end{aligned}$$

$$\text{Area} = \lim_{n \rightarrow \infty} S(n) = \frac{9}{2}(2) + 3 = 12$$

