

15. (a) $F'(x) = \sqrt{1+x^3}$ (b) $F'(x) = \sqrt{\frac{1+x^{3/2}}{4x}}$ (c) $\frac{1}{2} \sin \sqrt{x}$
 (d) $-e^{x^2}$ (e) $25 \sin x \cos x \sqrt{1+5 \sin x}$
 (f) $F'(x) = 2x^3 \sqrt{1+x^2} - x \sqrt{1+x}$

16. (a)

$$\begin{aligned} \lim_{n \rightarrow \infty} \frac{2}{n} \sum_{i=1}^n \left(1 + \frac{2i}{n}\right)^2 + \left(1 + \frac{2i}{n}\right) &= \lim_{n \rightarrow \infty} \sum_{i=1}^n \left(\frac{4}{n} + \frac{12i}{n^2} + \frac{8i^2}{n^3}\right) \\ &= \lim_{n \rightarrow \infty} \sum_{i=1}^n \frac{4}{n} + \frac{12}{n^2} \sum_{i=1}^n i + \frac{8}{n^3} \sum_{i=1}^n i^2 \\ &= \lim_{n \rightarrow \infty} 4 + \frac{12(n+1)}{2n} + \frac{8(n+1)(2n+1)}{6n^2} \\ &= 4 + 6 + \frac{8}{3} = \frac{38}{3} \end{aligned}$$

(b)

$$\begin{aligned} \lim_{n \rightarrow \infty} \frac{2}{n} \sum_{i=1}^n \left(7 \left(\frac{2i}{n}\right) + 1\right) &= \lim_{n \rightarrow \infty} \sum_{i=1}^n \left(\frac{28i}{n^2} + \frac{2}{n}\right) \\ &= \lim_{n \rightarrow \infty} \left(\frac{28}{n^2} \sum_{i=1}^n i + \frac{2}{n} \sum_{i=1}^n 1\right) \\ &= \lim_{n \rightarrow \infty} \frac{28(n+1)}{2n} + 2 = 14 + 2 = 16 \end{aligned}$$

(c)

$$\begin{aligned} \lim_{n \rightarrow \infty} \frac{1}{n} \sum_{i=1}^n \left(1 - \left(\frac{i}{n}\right)^3\right) &= \lim_{n \rightarrow \infty} \sum_{i=1}^n \left(\frac{1}{n} - \frac{i^3}{n^4}\right) \\ &= \lim_{n \rightarrow \infty} \left(\frac{1}{n} \sum_{i=1}^n 1 - \frac{1}{n^4} \sum_{i=1}^n i^3\right) \\ &= \lim_{n \rightarrow \infty} \left(1 - \frac{(n+1)^2}{4n^2}\right) = 1 - \frac{1}{4} = \frac{3}{4} \end{aligned}$$

17. (a) $\frac{1}{2}x^2 - \ln x \Big|_2^{2e} = 2e^2 - \ln(2e) - 2 + \ln(2) = 2e^2 - 3$ (b) $\frac{1}{5} \tan x^5 + C$

(c) $\frac{1}{3} \sinh x^3 + C$ (d) $\frac{1}{2} (\ln y)^2 + C$ (e) $\arctan(x^2 + x)$ (f) $\arcsin(x^2 + x)$

(g) $\arctan(x+3)$ (h) $-\frac{1}{2 \ln 2} 2^{1/x^2}$ (i) Ignore, it has $\operatorname{arcsinh}(\sin x)$.

(j) $\ln(x^2 + e^x)$ (k) $\frac{1}{3}(e-1)$ (l) $\ln |\ln(x)| + C$

18. (a) $y^3 = \frac{1}{3}x^3 + 2x$ (b) $y = K(2+x)^5$ OR $\ln |y| = 5 \ln |2+x| + C$

(c) $\arctan y = \arctan x + C$

19. (a) $y^2 = 4(1 - \sqrt{x} + \sqrt{2})$ (b) $y = 100000e^{-5x}$ (c) $y - 60 = 10e^{-2x+2}$