

1. $\frac{1}{2}$
2. $25e^{-5x} \cos(3x) + 30e^{-5x} \sin(3x) - 9e^{-5x} \cos(3x)$
3. (a.) 4
 (b.) $\log_2 6 = \frac{\ln 6}{\ln 2}$
4. $f'(x) = \frac{2x}{\sin^{-1}(x^2)\sqrt{1-x^4}}$
5. (a.) $f'(x) = \frac{\sqrt[3]{3x-1}(x-2)^3}{2\sqrt{x+1}} \left(\frac{1}{3x-1} + \frac{3}{x-2} - \frac{1}{2(x+1)} \right)$
 (b.) $f(x) = (x+x^2)^{\tan x} \left(\sec^2 x \ln(x+x^2) + \tan x \frac{1+2x}{x+x^2} \right)$
6. $\frac{3\pi}{4}$
7. $f'(x) = \frac{4x}{\sqrt{1+(\tan^{-1}(2x^2+3))^2} (1+(2x^2+3)^2)}$
8. (a.) $\frac{1}{2}$
 (b.) 0
 (c.) 1
9. The absolute maximum value is $\frac{4}{27}$; the absolute minimum value is -4.
10. (a.) No vertical asymptotes. Horizontal asymptote $y = 0$ as $x \rightarrow -\infty$.
 (b.) f is increasing on $(-\infty, -2) \cup (0, \infty)$. f is decreasing on $(-2, 0)$.
 (c.) f has a local max at $x = -2$. No absolute max. f has the absolute min at $x = 0$.
 (d.) f is CU on $(-\infty, -2 - \sqrt{2}) \cup (-2 + \sqrt{2}, \infty)$. f is CD on $(-2 - \sqrt{2}, -2 + \sqrt{2})$.
 (e.) f has inflection points at $x = -2 - \sqrt{2}, -2 + \sqrt{2}$.
11. $r = h = \sqrt[3]{\frac{V}{\pi}}$.
12. (a.) $F(x) = \frac{3}{7}x^{7/3} + x + C$
 (b.) $F(x) = -\cos x + 2 \tan^{-1} x + 3 \sin^{-1} x + C$
13. $s(t) = \frac{t^4}{12} - \frac{t^3}{6} + t$
14. $\vec{r}(t) = \left\langle \frac{t^3}{3} + t + 1, \frac{3t^2}{2} - t + 2 \right\rangle$

15. 40

$$16. x_i^* = 1 + \frac{3i}{n}, \Delta x_i = \frac{3}{n}, A = \lim_{n \rightarrow \infty} \frac{3}{n} \sum_{i=1}^n \left[\left(1 + \frac{3i}{n}\right)^2 + 3 \left(1 + \frac{3i}{n}\right) - 2 \right] = \frac{75}{2}$$

$$17. \int_0^1 \frac{dx}{1+x^2}$$

$$18. \int_0^6 f(x) dx$$