

Old Final 1:

1. a) T, b) F, c) F, d) T, e) T, f) F.
2. (d)
3. (c)
4. (a)
5. (c)
6. (b)
7. (a) 1, (b) $-1/2$
8. (a) $f'(x) = \frac{(2e^{2x} \cos x - e^{2x} \sin x)(\sqrt{x} + \sin x) - e^{2x} \sin x (\frac{1}{2\sqrt{x}} + \cos x)}{(\sqrt{x} + \sin x)^2}$.
(b) $f'(x) = 2 \tan(x + \ln x) \sec^2(x + \ln x)(1 + 1/x)$.
9. $y = -2(x - 1) = -2x + 2$.
10. Abs. Max. value is $f(-2) = 16$ achieved at $x = -2$
Abs. min. value is $f(2) = -16$ achieved at $x = 2$.
11. (a) $L(x) = -x + 1$; (b) $e^{-0.12} \approx 0.88$.
12. (a) $f(x)$ is increasing on $[-1, 1]$ and decreasing on $(-\infty, -1] \cup [1, \infty)$;
(b) $f(x)$ is concave up on $(-\sqrt{3}, 0) \cup (\sqrt{3}, \infty)$ and concave down on $(-\infty, -\sqrt{3}) \cup (0, \sqrt{3})$;
(c) Relative Maximum point: $(1, e^{-1/2})$; Relative Minimum point: $(-1, e^{-1/2})$;
Inflection points: $(0, 0)$, $(\sqrt{3}, \sqrt{3}e^{-3/2})$ and $(-\sqrt{3}, -\sqrt{3}e^{-3/2})$;
(d) Horizontal asymptote: $y = 0$.
13. (a) $v(t) = 3t^2 - 6t - 6 = 3(t^2 - 2t - 2)$; $a(t) = 6t - 6 = 6(t - 1)$.
(b) $s(1) = 0 = s(0)$.
(c) It speeds up before $t = 1$ and after $t = 1 + \sqrt{3}$; and slows down between $t = 1$ to $t = 1 + \sqrt{3}$.
(d) $v_{av} = -2$.

14. (a) $\frac{3}{4}x^{4/3} - \sin x + 3 \ln(|x|) - 5e^x + C$; (b) $\frac{2}{7}(x-1)^{7/2} + \frac{4}{5}(x-1)^{5/2} + \frac{2}{3}(x-1)^{3/2} + C$.
15. (a) 3; 13.

Old Final 2:

1. (a) Definition 1.5.1 on page 110; (b) $f(x) = |x|, x^{1/3}, \dots$
2. (a) 1; (b) -2 ; (c) -2 .
3. (a) $y' = 3e^{3x} \ln(x^2 - 1) + \frac{2xe^{3x}}{x^2 - 1}$; (b) $y' = \frac{1}{2}(\tan x)^{-1/2} \sec^2 x$.
4. $y = x$.
5. See Answer 10 (Old Final 1).
6. (a) $L(x) = x - 1$; (b) $\ln(1.234) \approx 0.234$.
7. See Answer 12 (Old Final Exam 1).
8. (a) $v(t) = 3t^2 - 12t + 9 = 3(t-1)(t-3)$, $a(t) = 6t - 12 = 6(t-2)$;
(b) Stopped at $t = 1$ and at $t = 3$;
(c) The particle speeds up from $t = 1$ to $t = 2$, and after $t = 3$; it slows down before $t = 1$ and from $t = 2$ to $t = 3$;
(d) $v_{av} = -2$.
9. (a) $-e^{-x} + \frac{3}{2} \cos(2x) + 4 \ln(|x|) + C$; (b) $\frac{2}{3}(x+1)^{3/2} - 2(x+1)^{1/2} + C$.
10. (a) $\ln(x^2 + 1)$; (b) 2.