

**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.