

Math 266 Exam 1 Review Answer Key**Draft 1**1. f^{-1} does not exist

2. $f^{-1}(x) = \frac{2-x}{x-1}$

3. $(f^{-1})'(0) = \frac{1}{2}$

4. $(f^{-1})'(-2) = \frac{1}{5}$

5. $f'(x) = \frac{1}{x \ln x}$

6. $f'(x) = \frac{\cos(\ln x)}{x}$

7. $f'(x) = -\tan x$

8. $f'(x) = -\frac{1}{2(1-x)(2-x)}$

9. $f'(x) = 2e^{\sin 2x} \cos 2x$

10. $y' = \frac{e^{\sqrt{x}}(\sqrt{x} \ln \sqrt{x} + 1)}{2x}$

11. $y' = -2e^{2x} \tan e^{2x}$

12. $f'(x) = e^{\tan x} \cdot \sec^2 x \cdot \sec(e^{\tan x}) \tan(e^{\tan x})$

13. $y' = 4(e^{4x} - e^{-4x})$

14. $g'(x) = \frac{1}{\ln 5 \cdot x(x+1)}$

15. $y' = 2^{5x} \cdot 3^{\ln x} \left(5 \ln 2 + \frac{\ln 3}{x} \right)$

16. $y' = (x^2 + 1)^{2x} \left[2 \ln(x^2 + 1) + \frac{4x^2}{x^2 + 1} \right]$

17. $y' = (\sin x)^{\cos x} \left(\frac{\cos^2 x}{\sin x} - \sin x \ln(\sin x) \right)$

18. $f'(x) = \frac{e^x}{1 + e^{2x}}$

19. $f'(x) = \sin^{-1} 2x + \frac{2x}{1 + 4x^2}$

20. $y' = \frac{\cos[\sec^{-1}(\ln x)]}{x \ln x \sqrt{\ln^2 x - 1}}$

21. $g'(x) = \frac{3}{\tan^{-1} 3x(1+9x^2)}$
22. $y' = (\sinh x)^x (\ln \sinh x + x \coth x)$
23. $f'(x) = \frac{3 \sinh(3 \ln x)}{x}$
24. $y' = \frac{1}{1 - \cosh x}$
25. $y' = \frac{1}{2} \sqrt{\frac{(x-1)(x-2)}{(x-3)(x-4)}} \left[\frac{1}{x-1} + \frac{1}{x-2} - \frac{1}{x-3} - \frac{1}{x-4} \right]$
26. $y' = \sqrt[3]{(3x-1)\sqrt{2x+5}} \left[\frac{1}{3x-1} + \frac{1}{3(2x+5)} \right]$
27. $-\frac{1}{2} \ln |4 - \tan 2x| + C$
28. $2 \ln(1 + \sqrt{x}) + C$
29. $-\frac{1}{\ln x} + C$
30. $3(e^x + 1)^{\frac{2}{3}} + C$
31. $\frac{1}{2} \cos(e^{-2x}) + C$
32. $-e^{-x} - \sin e^{-x} + C$
33. $-\frac{10^{-x^2}}{2 \ln 10} + C$
34. $\ln 3(\log_3 \sqrt{x} - 1)^2 + C$
35. $\ln |\sec(\ln x)| + C$
36. $9x - 6 \ln |\csc x - \cot x| - \cot x + C$
37. $\frac{1}{2} \sin^{-1} x^2 + C$
38. $\sin^{-1} \left(\frac{\tan x}{3} \right) + C$
39. $\ln(1 + \cosh x) + C$
40. $\frac{(1 + \tanh x)^2}{2} + C$
41. $\frac{1}{2}$
42. $\frac{185}{72} - \ln \frac{3}{2}$

43. $\frac{1}{\ln 2} + \frac{1}{3}$

44. $\cos^{-1} \frac{1}{3} - \frac{\pi}{3}$

45. a. 37,037

b. 2.5 hours

46. 3.2 years

47. 5.6 more minutes

48. $\frac{dy}{dt} = \frac{1}{e} \text{ m/sec}$

49. 2

50. a. $(-\infty, \infty)$

b. increasing on $[0, 2]$; decreasing on $(-\infty, 0] \cup [2, \infty)$

c. Local Min: $f(0) = 0$; Local Max: $f(2) = \frac{4}{e^2}$

d. concave up on $(-\infty, 2 - \sqrt{2}) \cup (2 + \sqrt{2}, \infty)$; concave down on $(2 - \sqrt{2}, 2 + \sqrt{2})$

e. Graph:

