

Module 2 Tutorial Exam Review Sheet

A. Determine the derivative of each of the following functions directly from the (limit) definition; i.e. the “Three-Step Method.”

1. $f(x) = 2x + 3$

2. $f(x) = 5 - 2x$

3. $f(x) = x^2$

4. $f(x) = 2x^2 + 5x$

5. $f(x) = x^3$

6. $f(x) = \frac{1}{x}$

7. $f(x) = \sqrt{x}$

8. $f(x) = \frac{1}{\sqrt{x}}$

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

10. $f(x) = \frac{5}{x^2} - 7$

B. Determine the derivative of each of the following functions using the shortcuts we have studied.

1. $f(x) = 2x + 3$

2. $C(x) = 2$

3. $L(x) = e^\pi$

4. $f(x) = \ln(\sin e^{3\pi} - \cos e^\pi)$

5. $f(x) = 5 - 2x$

6. $f(x) = \frac{1}{9} - \frac{7x}{4}$

7. $f(x) = x^2$

8. $f(x) = \sqrt{x}$

9. $f(x) = \frac{1}{x}$

10. $f(x) = \frac{4}{\sqrt{x}}$

11. $f(x) = 2x^2 + 5x$

12. $f(x) = x^{17}$

13. $f(x) = \frac{8}{x}$

14. $f(x) = \frac{-19}{x^2}$

15. $f(x) = 4\sqrt{x} + 2$

16. $f(x) = x^2 + 2x + 1$

17. $g(x) = x^2 + 5x - 7$

18. $h(x) = 7x^9 - 12x^4$

19. $j(t) = \frac{1}{t} + \frac{7}{t^2}$

20. $f(x) = 3\sqrt{x} - 9\sqrt{x^7}$

21. $f(x) = 2^x$
22. $L(x) = 2^{2x}$
23. $f(x) = 5 \cdot 4^x$
24. $g(x) = 3e^x$
25. $\Gamma(x) = e^{3x}$
26. $f(t) = te^t$
27. $f(x) = \frac{1}{e^x}$
28. $f(x) = e^{1/x}$
29. $T(x) = 10^{3x}$
30. $f(x) = \ln(5x)$
31. $f(x) = \ln \sqrt{x}$
32. $f(x) = \sin(3x)$
33. $f(x) = x^2 \sin(3x)$
34. $f(x) = 3x \sin x$
35. $f(x) = \cos(e^x)$
36. $f(x) = \cos(x - 4) + (\sin x)(\ln x)$
37. $f(x) = 2\frac{\sqrt{x}}{x^4} + \frac{9}{\sqrt{x}}$
38. $F(x) = (x^4 + 2x - 1)\sqrt{3x^2 - 2}$
39. $f(t) = (4t^7 + 9t^2 - 11t + 5) \left(\frac{4}{t} + \frac{1}{\sqrt{t}} \right)$
40. $K(x) = 5\sqrt{x}(3x^2 - 4x + 2)$
41. $f(x) = \frac{\sqrt{x}}{x^3} (x^{11} - 7x^4)$

42. $f(x) = e^x(5x^3 - 3x^2 + 1)$
43. $f(x) = (2x^9 + 17x^2 - 14) \cos x$
44. $f(x) = \sqrt{x} \cdot 6^x$
45. $f(x) = 11^x \cdot \frac{1}{\sqrt{x}}$
46. $f(x) = (\ln x)(e^x)$
47. $f(x) = e^x \cos x$
48. $f(x) = (3x^4 - 15\sqrt{x}) \sin(3x)$
49. $f(x) = 4^x \sin x$
50. $f(x) = \cos e^x$
51. $f(x) = \ln \sin x$
52. $g(t) = \sin(\cos t)$
53. $f(x) = \frac{\sin x}{\cos x}$
54. $f(x) = \frac{\sqrt{x}}{x^2+2x+1}$
55. $f(x) = \frac{e^x + \ln x}{2x+1}$
56. $f(x) = \frac{\ln x}{\sqrt{x}}$
57. $f(x) = \frac{11^x}{\sqrt{x}}$
58. $f(x) = \frac{x^e + 11x^2}{\sin x}$
59. $f(x) = \frac{\ln x}{e^x + x^4 + 1}$
60. $f(x) = \frac{x}{e^x + x^4 + 1}$
61. $f(x) = (x^4 + 7x^9 + 1)^{15}$
62. $f(x) = (x^4 + 7x^9 + 1)^{-15/2}$

$$63. f(x) = \sin(x^4 + 7x^9 + 1)$$

$$64. S(t) = 2e^{t^2+3t-1}$$

$$65. S(t) = te^{t^2+3t-1}$$

$$66. G(p) = \frac{p^4+3p^3+1}{p^5-2p^2+2}$$

$$67. R(\theta) = \sin^2 \theta + \cos^2 \theta.$$

C. Find an equation of the tangent line to each curve at the point $(a, f(a))$ for each given value of a .

1. $f(x) = \ln(\ln(x))$ with $a = 1, e, e^2$.

2. $f(x) = \cos x$ with $a = 2\pi, 3\pi, 4\pi$.

3. $f(x) = \sin x$ with $x = \frac{\pi}{2}, \pi, \frac{3\pi}{2}, 2\pi$.

4. $f(x) = 2x^4 + 3x^3 + 4x^2 + 5x + 6$ with $a = 1, 2, 5$.

5. $f(x) = e^{3x}$ with $a = 0, 1, 2$.