DERIVATIVE PRACTICE I: SOLUTIONS

I. Power Functions

A. Sums of Powers

1. $f'(x) = 15x^4 - 6x^2 + 6$

2. $f'(x) = -\frac{1}{3}x^{-4/3} + \frac{1}{3}x^{-2/3}$

3. $f'(x) = 12x^2 - \frac{3}{5}x^{-4} + 1$

4. $f'(x) = 2x - 8x^{3/5}$

5. $f'(x) = 1 - 4x^{-5}$

6. $f'(x) = \frac{1}{3}x^{-2/3} + \frac{1}{3}x^{-4/3}$

7. $f'(x) = -12x^{-2} + 12x^{-7} - 12x^{-3}$

8. $f'(x) = \frac{1}{4}x^{-3/4} - 3x^{-4}$

9. $f'(x) = 7x^6 - 24x^3 + 6x + 1$

10. $f'(x) = 15x^2 + 6x - 3$

11. $f'(x) = -28x^{-5} - 18x^{-4}$

12. $f'(x) = -18x^5 - x^{-2} - \frac{8}{3}x^{-1/3}$

13. $f'(x) = 33x^2 + 8x - 14x^{-3}$

14. $f'(x) = -15x^{-4} - \frac{3}{2}x^{-1/2} + 12x$

15. $f'(x) = 25x^4 + 9x^2 - 1$

16. $f'(x) = 12x^3 - 15x^2 - 6$

17. $f'(x) = 5x^4 - 2 + 12x^{-4}$

18. $f'(x) = 1 - 6x^{-2}$

19. $f'(x) = 4x^{-3} + 14x - 3x^{-4}$

20. $f'(x) = \frac{5}{2}x^{3/2} - \frac{3}{2}x^{-5/2}$

B. Products and Powers

21. $f'(x) = 7(x^5 + 2x^4 + 3)^6 \cdot (5x^4 + 8x^3)$

22. $f'(x) = \frac{1}{2}(x^6 + x^4 + 9)^{-1/2} \cdot (6x^5 + 4x^3)$

23. $f'(x) = \frac{1}{2}(x^3 + 3x + 2)^{-1/2} \cdot (3x^2 + 3)$

24. $f'(x) = 3(x^4 - 4x)^2 \cdot (4x^3 - 4)$

25. $f'(x) = \frac{3}{2}(3x^2 - 2)^{1/2} \cdot 6x$

26. $f'(x) = \frac{1}{3}(5x^2 - 3x + 2)^{-2/3} \cdot (10x - 3)$

27. $f'(x) = 4x^3(4x^3 + 2) + (x^4 + 3) \cdot 12x^2$

28. $f'(x) = 12(3x - 7)^{11} \cdot 3$

29. $f'(x) = -4(5x - 6)^{-5} \cdot 5$

30. $f'(x) = 3x^2(x^2 - 4) + x^3 \cdot 2x$

31. $f'(x) = \frac{1}{3}(x^3 + 27)^{-2/3} \cdot 3x^2$

32. $f'(x) = 6x(5x^3 + 2x + 3) + (3x^2 + 4)(15x^2 + 2)$

33. $f'(x) = -\frac{1}{3}(4x^5 + 5x)^{-4/3} \cdot (20x^4 + 5)$

34. $f'(x) = 4x^3(x^7 + 5x^3 + 2) + (x^4 + 3)(7x^6 + 15x^2)$

35. $f'(x) = 5x^4(x^4 + 5x^3 - 2x) + x^5(4x^3 + 15x^2 - 2)$

36. $f'(x) = -6x^{-7}(3x^2 + 5) + x^{-6} \cdot 6x$

37. $f'(x) = -\frac{2}{3}(6x^6 + 4x + 2)^{-5/3} \cdot (36x^5 + 4)$

38. $f'(x) = (4x^3 + 3)(x^9 + 4x + 5) + (x^4 + 3x + 7)(9x^8 + 4)$

39. $f'(x) = \frac{1}{5}(x^5 + 1)^{-4/5} \cdot 5x^4$

40. $f'(x) = \frac{1}{2}x^{-1/2}(x^4 + 3x^2 + 2) + \sqrt{x}(4x^3 + 6x)$

C. Quotients and Powers

41. $f'(x) = \dfrac{(3x^2 + 1)(x^3 + 1) - (x^3 + x + 1) \cdot 3x^2}{(x^3 + 1)^2}$

42. $f'(x) = \dfrac{3(4x + 3) - (3x + 4) \cdot 4}{(4x + 3)^2}$

43. $f'(x) = \dfrac{5(2x - 3) - (5x + 1) \cdot 2}{(2x - 3)^2}$

44. $f'(x) = \dfrac{(4x^3 + 4) \cdot x^3 - (x^4 + 4x - 1) \cdot 3x^2}{x^6}$

45. $f'(x) = \dfrac{(2x + 4)(x^2 - 4x + 1) - (x^2 + 4x + 1)(2x - 4)}{(x^2 - 4x + 1)^2}$

46. $f'(x) = \dfrac{(1 + 4x^3)\sqrt[3]{x} - (x + x^4) \cdot \frac{1}{3}x^{-2/3}}{(\sqrt[3]{x})^2}$

47. $f'(x) = -8(\sqrt{x} + 3)^{-2} \cdot \frac{1}{2}x^{-1/2}$

48. $f'(x) = -10(5 + x^3)^{-2} \cdot 3x^2$

49. $f'(x) = \dfrac{(6x^2 - 3)(5x^2 - 4) - (2x^3 - 3x + 2) \cdot 10x}{(5x^2 - 4)^2}$

50. $f'(x) = \dfrac{(15x^2 - 3)(3x^2 + 5) - (5x^3 - 3x + 7) \cdot 6x}{(3x^2 + 5)^2}$

51. $f'(x) = \dfrac{3(x^3 + 3x) - (3x - 2)(3x^2 + 3)}{(x^3 + 3x)^2}$

52. $f'(x) = \dfrac{(-3 + 6x^2)(x^2 + 4) - (5 - 3x + 2x^3) \cdot 2x}{(x^2 + 4)^2}$

53. $f'(x) = \dfrac{(x - 1) - (x + 1)}{(x - 1)^2}$

54. $f'(x) = \dfrac{3x^2(x^3 + 2) - x^3 \cdot 3x^2}{(x^3 + 2)^2}$

55. $f'(x) = -(x^5 - 3x + 2)^{-2} \cdot (5x^4 - 3)$

56. $f'(x) = 6x + \dfrac{(-1) \cdot x^2 - (3 - x) \cdot 2x}{x^4}$

57. $f'(x) = \dfrac{2x(x^3 + 2) - (x^2 - 3) \cdot 3x^2}{(x^3 + 2)^2}$

58. $f'(x) = \dfrac{\frac{1}{2}x^{-1/2} \cdot (x + x^4) - \sqrt{x}(1 + 4x^3)}{(x + x^4)^2}$

59. $f'(x) = \dfrac{\frac{1}{2}x^{-1/2} \cdot (\sqrt{x} - 3) - (\sqrt{x} + 3) \cdot \frac{1}{2}x^{-1/2}}{(\sqrt{x} - 3)^2}$

60. $f'(x) = \dfrac{4x^3(\sqrt{x} + 3) - x^4 \cdot \frac{1}{2}x^{-1/2}}{(\sqrt{x} + 3)^2}$

D. Products, Quotients, and Composites

61. $f(x) = \frac{1}{2}(x^2 + 1)^{-1/2} \cdot 2x \cdot (x + 1) + \sqrt{x^2 + 1}$

62. $f'(x) = 2x\sqrt{1 - x^4} + x^2 \cdot \frac{1}{2}(1 - x^4)^{-1/2} \cdot (-4x^3)$

63. $f'(x) = 4(2x^3 + 3)^7 + (4x - 2) \cdot 7(2x^3 + 3)^6 \cdot 6x^2$

64. $f'(x) = 4(3x - 2)^3 \cdot 3 \cdot (2x + 3)^5 + (3x - 2)^4 \cdot 5(2x + 3)^4 \cdot 2$

65. $f'(x) = 3(2x + 7)^2 \cdot 2 \cdot (2x^3 - 15x + 4)^{1/3} + (2x + 7)^3 \cdot \frac{1}{3}(2x^3 - 15x + 4)^{-2/3} \cdot (6x^2 - 15)$

66. $f'(x) = 24x^7(2x^3 - 7x + 11)^5 + (3x^8 - 5) \cdot 5(2x^3 - 7x + 11)^4 \cdot (6x^2 - 7)$

67. $f'(x) = 4(3x - 2)^3 \cdot 3 \cdot (4x + 3) + (3x - 2)^4 \cdot 4$

68. $f'(x) = 3(3x^2 - 1)^2 \cdot 6x \cdot (x^7 + x)^4 + (3x^2 - 1)^3 \cdot 4(x^7 + x)^3 \cdot (7x^6 + 1)$

69. $f'(x) = -x^{-2}(x^3 - 2)^{1/2} + (\frac{1}{x} + 2) \cdot \frac{1}{2}(x^3 - 2)^{-1/2} \cdot 3x^2$

70. $f'(x) = 4(3x + 1)^3 \cdot 3 \cdot (x^3 + 2)^5 + (3x + 1)^4 \cdot 5(x^3 + 2)^4 \cdot 3x^2$

71. $f'(x) = 3x^2(x^4 + 3)(x^5 + 1) + (x^3 + 2) \cdot 4x^3 \cdot (x^5 + 1) + (x^3 + 2)(x^4 + 3) \cdot 5x^4$

72. $f'(x) = \frac{1}{2}(x^4 + 1)^{-1/2} \cdot 4x^3 \cdot \sqrt[3]{x^6 + 1} + \sqrt{x^4 + 1} \cdot \frac{1}{3}(x^6 + 1)^{-2/3} \cdot 6x^5$

73. $f'(x) = 8\left[(x^2 + 3)(x^5 + 2)\right]^7 \cdot \left[2x(x^5 + 2) + (x^2 + 3) \cdot 5x^4\right]$

74. $f'(x) = \frac{1}{2}[(x^2 + 4)(x^4 + 2)]^{-1/2} \cdot [2x(x^4 + 2) + (x^2 + 4) \cdot 4x^3]$

75. $f'(x) = 5x^4(x^4 + 3)(x^2 + 1) + x^5 \cdot 4x^3 \cdot (x^2 + 1) + x^5(x^4 + 3) \cdot 2x$

76. $f'(x) = \frac{1}{2}\left(\frac{x^4 + 2}{x^4 + 1}\right)^{-\frac{1}{2}} \cdot \frac{4x^3(x^4 + 1) - (x^4 + 2) \cdot 4x^3}{(x^4 + 1)^2}$

77. $f'(x) = 5\left(\frac{x - 1}{x + 1}\right)^4 \cdot \frac{(x + 1) - (x - 1)}{(x + 1)^2}$

78. $f'(x) = \frac{1}{3}\left(\frac{3x}{x^4 + 1}\right)^{-\frac{2}{3}} \cdot \frac{3(x^4 + 1) - 3x \cdot 4x^3}{(x^4 + 1)^2}$

79. $f'(x) = -(3x + 1)^{-3/2} \cdot 3$

80. $f'(x) = \dfrac{2(x^4 - 4x + 3)(4x^3 - 4)(x^5 - 5x + 4)^2 - (x^4 - 4x + 3)^2 \cdot 2(x^5 - 5x + 4)(5x^4 - 5)}{(x^5 - 5x + 4)^4}$

81. $f'(x) = -\frac{7}{3}(x^5 + 2)^{-4/3} \cdot 5x^4$

82. $f'(x) = 5x^4 \cdot \left(\frac{x^3 + 1}{x^3 - 1}\right) + x^5 \cdot \left(\frac{3x^2(x^3 - 1) - (x^3 + 1) \cdot 3x^2}{(x^3 - 1)^2}\right)$

83. $f'(x) = -4\left(\frac{x^2 + 5x + 3}{x^2 + 3x + 5}\right)^{-5} \cdot \frac{(2x + 5)(x^2 + 3x + 5) - (x^2 + 5x + 3)(2x + 3)}{(x^2 + 3x + 5)^2}$

84. $f'(x) = -\frac{1}{3}\left(\frac{5x}{x^5 + 3}\right)^{-\frac{4}{3}} \cdot \frac{5(x^5 + 3) - 5x \cdot 5x^4}{(x^5 + 3)^2}$

85. $f'(x) = \dfrac{\left[3(x + 2)^2(x + 4)^5 + (x + 2)^3 \cdot 5(x + 4)^4\right](x + 6)^7 - (x + 2)^3(x + 4)^5 \cdot 7(x + 6)^6}{(x + 6)^{14}}$

86. $f'(x) = \dfrac{\left[5x^4(x + 3)^2 + (x^5 + 2) \cdot 2(x + 3)\right](x + 4) - (x^5 + 2)(x + 3)^2}{(x + 4)^2}$

87. $f'(x) = \dfrac{3(x^4 + 2)^2 \cdot 4x^3 \cdot (x^3 + 2)^5 - (x^4 + 2)^3 \cdot 5(x^3 + 2)^4 \cdot 3x^2}{(x^3 + 2)^{10}}$

88. $f'(x) = -3\left(\frac{x - 5}{x + 5}\right)^{-4} \cdot \frac{(x + 5) - (x - 5)}{(x + 5)^2}$

89. $f'(x) = \dfrac{\frac{1}{2}(x^2 + 1)^{-1/2} \cdot 2x \cdot \sqrt[4]{x^4 + 1} - \sqrt{x^2 + 1} \cdot \frac{1}{4}(x^4 + 1)^{-3/4} \cdot 4x^3}{(\sqrt[4]{x^4 + 1})^2}$

90. $f'(x) = \dfrac{2x\sqrt[3]{1 - x^3} - (x^2 + 3) \cdot \frac{1}{3}(1 - x^3)^{-2/3} \cdot (-3x^2)}{(\sqrt[3]{1 - x^3})^2}$

II. Trigonometric Functions

A. Trigonometric and Power Functions

91. $f'(x) = (\cos(x^3 + 3)) \cdot 3x^2$

92. $f'(x) = (\cos(5x)) \cdot 5$

93. $f'(x) = (-\sin(7x)) \cdot 7$

94. $f'(x) = (-\sin(x^2 + 5)) \cdot 2x$

95. $f'(x) = (\sec^2(x^3 + 7)) \cdot 3x^2$

96. $f'(x) = [\sec(2x + 3)\tan(2x + 3)] \cdot 2$

97. $f'(x) = 3\sec^2 x - \sec x \tan x$

98. $f'(x) = 1 - \cos x$

99. $f'(x) = [\sec(3x - x^2)\tan(3x - x^2)](3 - 2x)$

100. $f'(x) = (\sec^2(2x^3 - 3x + 2))(6x^2 - 3)$

101. $f'(x) = (-\sin(3x - \pi)) \cdot 3$

102. $f'(x) = 5(\cos(x^2)) \cdot 2x - 2\sin x$

103. $f'(x) = -3\sin x - 2\cos x$

104. $f'(x) = (-\sec^2(\pi x - 3)) \cdot \pi$

105. $f'(x) = (\cos(2x)) \cdot 2 - (\sec(2x)\tan(2x)) \cdot 2$

106. $f'(x) = 3x^2 \tan x + x^3 \sec^2 x$

107. $f'(x) = (-\sin(3x + 2)) \cdot 3$

108. $f'(x) = (-\sin(2\pi x)) \cdot 2\pi$

109. $f'(x) = (-\sin(1/\sqrt{x})) \cdot \left(-\frac{1}{2}x^{-3/2}\right)$

110. $f'(x) = (\sec^2(1/x)) \cdot (-x^{-2})$

111. $f'(x) = (\cos(-x)) \cdot (-1)$

112. $f'(x) = [\sec(\frac{1}{2} - \pi x)\tan(\frac{1}{2} - \pi x)](-\pi)$

113. $f'(x) = (\sec^2(x^2 + 1)) \cdot 2x$

114. $f'(x) = (\sec(5x)\tan(5x)) \cdot 5$

115. $f'(x) = \sin x + x\cos x$

116. $f'(x) = \tan(3x) + x(\sec^2(3x)) \cdot 3$

117. $f'(x) = 3x^2 \tan(3/x) + x^3(\sec^2(3/x))(-3x^{-2})$

118. $f'(x) = 5(\sec(3x)\tan(3x)) \cdot 3 - 4(-\sin(2x)) \cdot 2$

119. $f'(x) = 3x^2 \cos x + (x^3 + 2)(-\sin x)$

120. $f'(x) = 2x\sin(x^3 + 1) + x^2(\cos(x^3 + 1)) \cdot 3x^2$

B. Products and Trigonometric Functions

121. $f'(x) = 6(\tan(4x))(\sec^2(4x)) \cdot 4$

122. $f'(x) = 3(\sin^2(x^2))(\cos(x^2)) \cdot 2x$

123. $f'(x) = (-\sin(4x)) \cdot 4 \cdot \sin(7x) + (\cos(4x))(\cos(7x)) \cdot 7$

124. $f'(x) = 2(\cos(3x))(-\sin(3x)) \cdot 3 + 2(\sin(7x))(\cos(7x)) \cdot 7$

125. $f'(x) = 3\left(\cos^2\left(x + \frac{1}{x}\right)\right)\left(-\sin\left(x + \frac{1}{x}\right)\right)(1 - x^{-2})$

126. $f'(x) = 3(\cos^2(x - 2))(-\sin(x - 2))$

127. $f'(x) = 4(\sin^3(x^3 - x))(\cos(x^3 - x))(3x^2 - 1)$

128. $f'(x) = (-\sin x)\sin^3 x + (\cos x) \cdot 3(\sin^2 x)\cos x$

129. $f'(x) = 20(\sec^3(3 - 7x))[\sec(3 - 7x)\tan(3 - 7x)] \cdot (-7)$

130. $f'(x) = 4(\cos^3(4x))(-\sin(4x)) \cdot 4 + 3(-\sin(4x)) \cdot 4$

131. $f'(x) = 3\cos x + 10(\sin^4 x)\cos x$

132. $f'(x) = 6(\tan^2 x)\sec^2 x + 6(\tan x)\sec^2 x$

133. $f'(x) = 6(\cos^2(x+3))(-\sin(x+3)) + 2(-\sin(x+3))$

134. $f'(x) = 8x^3 - 4(\sec x)(\sec x \tan x) - \sin x$

135. $f'(x) = 2(\cos x)(-\sin x) + 2(\sin x)\cos x \; [= 0]$

136. $f'(x) = (\cos x - \sin x)\tan x + (\sin x + \cos x)\sec^2 x$

137. $f'(x) = 2(-\sin x)\tan x + 2(\cos x)\sec^2 x$

138. $f'(x) = 2(\sin x)(\cos x)\sec x + (\sin^2 x)(\sec x \tan x)$

139. $f'(x) = 1 + 3(\sec^2 x)(\sec x \tan x)$

140. $f'(x) = (\sec x \tan x)\cos x + (\sec x)(-\sin x)$

141. $f'(x) = 5(\tan^4 x)(\sec^2 x)\sec x + (\tan^5 x)(\sec x \tan x)$

142. $f'(x) = 3(\sin^2 x)\cos x + (\cos(x^3)) \cdot 3x^2$

143. $f'(x) = (-\sin x)(\sin x)(\sec x) + (\cos x)(\cos x)(\sec x) + (\cos x)(\sin x)(\sec x \tan x)$

144. $f'(x) = 2(\cos x)(-\sin x)\sin^3 x + (\cos^2 x) \cdot 3(\sin^2 x)\cos x$

145. $f'(x) = 3(\tan^2 x)(\sec^2 x)\sec^2 x + (\tan^3 x) \cdot 2(\sec x)(\sec x \tan x)$

146. $f'(x) = (-\sin x)(\tan x + \sec x) + (\cos x)(\sec^2 x + \sec x \tan x)$

147. $f'(x) = 7(\sec^2 x)\sin x + 7(\tan x)\cos x$

148. $f'(x) = 2(\sin x)\cos x - 2(\cos x)(-\sin x)$

149. $f'(x) = 24(\sec^5(5x))(\sec(5x)\tan(5x)) \cdot 5$

150. $f'(x) = 2(\tan x)\sec^2 x - 2(\sec x)(\sec x \tan x) \ [= 0]$

C. Quotients and Trigonometric Functions

151. $f'(x) = \dfrac{(-\sin x) \cdot x - \cos x}{x^2}$

152. $f'(x) = \dfrac{(\cos x)\cos x - (\sin x)(-\sin x)}{\cos^2 x} \ [= \sec^2 x]$

153. $f'(x) = -(\tan x)^{-2}(\sec^2 x)$

154. $f'(x) = \dfrac{(\sec x \tan x)(1 - \sec x) - \sec x(-\sec x \tan x)}{(1 - \sec x)^2}$

155. $f'(x) = \dfrac{(-\sin x)(1 + x^4) - (\cos x) \cdot 4x^3}{(1 + x^4)^2}$

156. $f'(x) = \dfrac{(-\sec^2 x)(1 + \tan x) - (1 - \tan x)\sec^2 x}{(1 + \tan x)^2}$

157. $f'(x) = \dfrac{3x^2 \sec x - x^3 \sec x \tan x}{\sec^2 x}$

158. $f'(x) = \dfrac{\sin x - x\cos x}{\sin^2 x}$

159. $f'(x) = \dfrac{(-\sin x)(\sin x + 5) - (\cos x - 5)\cos x}{(\sin x + 5)^2}$

160. $f'(x) = \dfrac{(-\sin x + \cos x)\tan x - (\cos x + \sin x)\sec^2 x}{\tan^2 x}$

161. $f'(x) = 3x^2 + (\sin x)^{-2} \cdot \cos x$

162. $f'(x) = \dfrac{3x^2(\cos x + \sin x) - (x^3 + 2)(-\sin x + \cos x)}{(\cos x + \sin x)^2}$

163. $f'(x) = \dfrac{(\sec^2 x)\cos x - (\tan x)(-\sin x)}{\cos^2 x}$

164. $f'(x) = \dfrac{(\sec x \tan x)(\sin x) - (\sec x)\cos x}{\sin^2 x}$

165. $f'(x) = \dfrac{(\sec x \tan x)(1 - \sec x) - (1 + \sec x)(-\sec x \tan x)}{(1 - \sec x)^2}$

166. $f'(x) = \dfrac{(\cos x)(1 + \cos x) - (\sin x)(-\sin x)}{(1 + \cos x)^2}$

167. $f'(x) = \dfrac{(-\sin(x^3 + 2)) \cdot 3x^2 \cdot \tan x - (\cos(x^3 + 2))\sec^2 x}{\tan^2 x}$

168. $f'(x) = \dfrac{(\sec^2 x)\sec x - (\tan x)\sec x \tan x}{\sec^2 x}$

169. $f'(x) = \dfrac{[3x^2 \cos x + x^3(-\sin x)](x^7 + 5) - (x^3 \cos x) \cdot 7x^6}{(x^7 + 5)^2}$

170. $f'(x) = \dfrac{(-\sin(x^4)) \cdot 4x^3 \cdot \cos^4 x - (\cos(x^4)) \cdot 4(\cos^3 x)(-\sin x)}{\cos^8 x}$

171. $f'(x) = \dfrac{(3 - \sec x \tan x)(3x + \sec x) - (3x - \sec x)(3 + \sec x \tan x)}{(3x + \sec x)^2}$

172. $f'(x) = \dfrac{(\sec^2 x - \sin x)(\sec x + \sin x) - (\tan x + \cos x)(\sec x \tan x + \cos x)}{(\sec x + \sin x)^2}$

173. $f'(x) = \dfrac{(\sec^2 x) \cdot x^3 - (\tan x) \cdot 3x^2}{x^6}$

174. $f'(x) = \dfrac{(-\sin(x^3 + 2)) \cdot 3x^2 \cdot \sin(x^3 + 2) - (\cos(x^3 + 2))(\cos(x^3 + 2)) \cdot 3x^2}{\sin^2(x^3 + 2)}$

175. $f'(x) = -5(\sin(x^4))^{-2}(\cos(x^4)) \cdot 4x^3$

176. $f'(x) = \dfrac{(-\sin x)(1 - \cos x) - (1 + \cos x)\sin x}{(1 - \cos x)^2}$

177. $f'(x) = \dfrac{(3x^2 + \cos x)(x + \sin^3 x) - (x^3 + \sin x)(1 + 3(\sin^2 x)\cos x)}{(x + \sin^3 x)^2}$

178. $f'(x) = \dfrac{(\sec^2(x^3)) \cdot 3x^2 \cdot \tan^3 x - (\tan(x^3)) \cdot 3(\tan^2 x)\sec^2 x}{\tan^6(x)}$

179. $f'(x) = \dfrac{(\sec(x^4)\tan(x^4)) \cdot 4x^3 \cdot \sec^4 x - (\sec(x^4)) \cdot 4(\sec^3 x)\sec x \tan x}{\sec^8 x}$

180. $f'(x) = \dfrac{5(\sec^4 x)(\sec x \tan x) \cdot x^5 - (\sec^5 x) \cdot 5x^4}{x^{10}}$

D. Composites and Trigonometric Functions

181. $f'(x) = (\sec(\cos x)\tan(\cos x))(-\sin x)$

182. $f'(x) = (\cos(\sec x))(\sec x \tan x)$

183. $f'(x) = \frac{1}{2}(\cos x)^{-1/2} \cdot (-\sin x)$

184. $f'(x) = -(\tan x - x\sin x)^{-2} \cdot [\sec^2 x - (\sin x + x\cos x)]$

185. $f'(x) = \frac{1}{2}(\tan(3x))^{-1/2} \cdot (\sec^2(3x)) \cdot 3$

186. $f'(x) = \frac{1}{2}(\cos^{-1/2}(3x)) \cdot (-\sin(3x)) \cdot 3$

187. $f'(x) = \frac{2}{3}(\cos(x+1))^{-1/3} \cdot (-\sin(x+1))$

188. $f'(x) = (-\sin\sqrt{x}) \cdot \frac{1}{2}x^{-1/2} + \frac{1}{2}(\cos x)^{-1/2} \cdot (-\sin x)$

189. $f'(x) = \frac{1}{2}(1 - \cos^2 x)^{-1/2} \cdot (-2\cos x)(-\sin x)$

190. $f'(x) = (-\sin x)\sqrt{\sin x} + (\cos x) \cdot \frac{1}{2}(\sin x)^{-1/2} \cdot \cos x$

191. $f'(x) = (-\sin(\sin x))\cos x$

192. $f'(x) = \frac{1}{5}(\cos x + \sec x)^{-4/5} \cdot (-\sin x + \sec x \tan x)$

193. $f'(x) = -7(\tan x)^{-8} \cdot \sec^2 x$

194. $f'(x) = (\sec^2(\sec x))\sec x \tan x$

195. $f'(x) = \frac{1}{3}(\cos^{-2/3}(\sqrt[3]{x}))(-\sin(\sqrt[3]{x})) \cdot \frac{1}{3}x^{-2/3}$

196. $f'(x) = (\sec^2(\sin x + \cos x))(\cos x - \sin x)$

197. $f'(x) = (-4\sin^{-5}(x^4))(\cos(x^4)) \cdot 4x^3$

198. $f'(x) = \frac{1}{2}(\sec x + \sin x)^{-1/2} \cdot (\sec x \tan x + \cos x)$

199. $f'(x) = 7(x + \sin^2 x)^6 \cdot (1 + 2(\sin x)\cos x)$

200. $f'(x) = (\cos(1 + \sec^3 x)) \cdot (3\sec^2 x)\sec x \tan x$