Review Packet for Exam #1

Math 12-D. Benedetto

Derivatives: Compute the derivative for each of the following functions. Do not worry about simplifying your answers:

1. $f(x) = \sinh^{-1}(\ln(\cos^3 x))$
2. $f(x) = \dfrac{\cosh(\sqrt{x})}{5e^{2x}}$
3. $f(x) = \dfrac{1}{\arctan(17x)}$
4. $f(x) = 3(\cosh x)e^{\tan x}$
5. $f(x) = \sin(4x)\cos(4x) + 2\sin^{-1}(4+x)$
6. $f(x) = e^{5x}\cos^{-1}(5x)$
7. $f(x) = \dfrac{e^{\sinh x}}{\sqrt{1-9x^2}}$
8. $f(x) = \dfrac{\sqrt{x^2+4}}{\arcsin(3x)}$
9. $f(x) = \sinh^{-1}\left(\dfrac{e^{\sin x}}{x-7}\right)$
10. $f(x) = e^{\cosh\left(\dfrac{1}{\arcsin(7x)}\right)}$
11. $f(x) = \sinh(\arcsin x)$
12. $f(x) = \sinh\left(e^{\cosh(2x)}\right)$
13. $f(x) = \arcsin x \cdot \arctan x$
14. $f(x) = \arctan(\sin(\ln x))$
15. $f(x) = \dfrac{4}{\sqrt{\ln^2 x - 1}}$
16. $f(x) = \dfrac{\tan^{-1}(x+3)}{\ln|x|}$
17. $f(x) = \ln(\arccos(x^3))$
18. $f(x) = \dfrac{\arccos x}{\cosh(x-1)}$
19. $f(x) = \dfrac{\sinh x}{(x-3)^2}$

20. $f(x) = \dfrac{\sinh x}{x^2 + \cosh x + 3}$

21. $f(x) = \dfrac{\sinh(3x)}{\cosh(4x)}$

22. $f(x) = \cosh^{-1}(3x + 4)$

23. $f(x) = \dfrac{\arctan(x + 2)}{\sec^2 x}$

24. $f(x) = \arctan\left(\dfrac{x^2}{\sqrt{3x + 1}}\right)$

25. $f(x) = \dfrac{\sinh(x^2 - 2)}{x + \sin^{-1} x}$

26. $f(x) = \dfrac{5 \sinh x \tanh x}{\cosh x}$

27. $f(x) = \dfrac{\sec(5x^2)}{\arctan\left(\frac{x}{3}\right)}$

28. $f(x) = \dfrac{\arctan(5x)}{\tanh(10x - 1)}$

29. $f(x) = \sec^{-1}(3x)$

30. $f(x) = \tanh^{-1}\left(\dfrac{1}{\cos x}\right)$

31. $f(x) = \cosh\left(e^{\arccos e^x}\right)$

Limits: Compute each of the following limit.

32. $\lim\limits_{x \to 1} \dfrac{5x - 5}{\ln x \cdot \cos x}$

33. $\lim\limits_{x \to 0} \dfrac{\sin(3x)}{9 \cos x - 5x - 9}$

34. $\lim\limits_{x \to 1} \dfrac{\cos\left(\dfrac{\pi}{2} x\right)}{x^2 - x}$

35. $\lim\limits_{x \to 3} \dfrac{\sin(x - 3)}{x^2 - 9}$

36. $\lim\limits_{x \to \infty} \dfrac{5x^2 + 7x}{3x^2 + x}$

37. $\lim\limits_{x \to \infty} \dfrac{x^2 - 3x}{e^x - e^{-x}}$

38. $\lim\limits_{x \to 0} (1 - \sin(2x))^{\frac{1}{x}}$

39. $\lim_{x\to 3} \dfrac{x^2-9}{3-x}$

40. $\lim_{x\to 0^+} \left(\dfrac{1}{e^x-1} - \dfrac{1}{x}\right)$

41. $\lim_{x\to\infty} \left(1+\dfrac{1}{x}\right)^x$

42. $\lim_{x\to 0} \dfrac{e^x-1}{\ln(x+1)}$

43. $\lim_{x\to \frac{\pi}{2}} \dfrac{\tan x}{1+\tan x}$

44. $\lim_{x\to 1} \dfrac{\ln x}{x^3-1}$

45. $\lim_{x\to\infty} \dfrac{\arctan x}{x}$

46. $\lim_{x\to 0^+} x^3 \ln x$

47. $\lim_{x\to 0^+} x \ln x$

48. $\lim_{x\to 0} \dfrac{e^{2x}-e^x}{\sin(3x)}$

49. $\lim_{x\to 0} \dfrac{\sinh x}{3x}$

50. $\lim_{x\to 2} \dfrac{x-2+\sin(x-2)}{x^2-6x+8}$

51. $\lim_{x\to 0} \dfrac{x\sin x}{\cos x - 1}$

52. $\lim_{x\to 0} x^{\sin x}$

53. $\lim_{x\to 0^+} (\cos x)^{\frac{1}{x}}$

54. $\lim_{x\to \frac{\pi}{2}^+} \dfrac{\cos x}{1-\sin x}$

55. $\lim_{x\to 0^+} x \ln\left(\dfrac{1}{x}\right)$

56. $\lim_{x\to 0^+} xe^{\frac{1}{x}}$

57. $\lim_{x\to 0^-} xe^{\frac{1}{x}}$

58. $\lim_{x\to 1} \dfrac{3\cos(1-x)-3x}{\sin(1-x)}$

59. $\lim_{x\to\infty} \dfrac{e^x}{\ln x}$

60. $\lim_{x\to\infty} x^{\frac{1}{x^2}}$

61. $\lim_{x\to 0^+} \dfrac{\ln x - 1}{\arcsin x}$

62. $\lim_{x\to 0} \dfrac{x}{\tan x}$

63. $\lim_{x\to 1^+} x^{\frac{1}{x-1}}$

64. $\lim_{x\to\pi} \dfrac{\cos x \sin x}{x-\pi}$

65. $\lim_{x\to \frac{\pi}{2}^-} \tan x - \sec x$

66. $\lim_{x\to 0^+} (1-2x)^{\frac{1}{x}}$

67. $\lim_{x\to\infty} (x^2+1)^{\frac{1}{\ln x}}$

68. $\lim_{x\to\infty} (e^x+1)^{\frac{1}{x}}$

69. $\lim_{x\to\infty} \left(\cos\dfrac{1}{x}\right)^x$

70. $\lim_{x\to\infty} \left(x^3+1\right)^{\frac{1}{\ln x}}$

71. $\lim_{x\to 0^+} \dfrac{1}{\ln(x+1)} - \dfrac{1}{x}$

72. $\lim_{x\to 1^+} \dfrac{1}{\ln x} - \dfrac{x}{x-1}$

73. $\lim_{x\to 0^+} (1+\sinh x)^{\frac{1}{\sqrt{x}}}$

74. $\lim_{x\to\infty} x^2 \sin\left(\dfrac{1}{x^2}\right)$

75. $\lim_{x\to 0^+} \sqrt{x}\ln x$

76. $\lim_{x\to 1} \dfrac{e^{x^2}-e^x}{\ln x}$

77. $\lim_{x\to 0} (1+3x)^{\frac{2}{x}}$

78. $\lim_{x\to\infty} x(2e^{\frac{1}{x}}-2)$

79. $\lim_{x\to\infty} \left(1-\dfrac{3}{x}\right)^{4x}$

80. $\lim_{x\to 0^+} (\cos x)^{\frac{1}{x^2}}$

81. $\lim_{x\to 0^+} (\cos \sqrt{x})^{\frac{1}{x}}$

82. $\lim_{x\to \infty} (e^x + x)^{\frac{1}{x}}$

83. $\lim_{x\to 0} \dfrac{\sinh^{-1} x}{x}$

Integrals: Compute each of the following integrals.

84. $\displaystyle\int (e^x + x)^2 \ dx$

85. $\displaystyle\int \frac{\sec^2(3x)}{\sqrt{1+\tan^2(3x)}} \ dx$

86. $\displaystyle\int (x+7)e^{2x+3} \ dx$

87. $\displaystyle\int_{\frac{\pi}{6}}^{\frac{\pi}{4}} x \sec^2 x \ dx$

88. $\displaystyle\int \frac{1+x}{\sqrt{x^2-1}} \ dx$

89. $\displaystyle\int x \sin^2 x \ dx$

90. $\displaystyle\int \tan^2 x \cos^4 x \ dx$

91. $\displaystyle\int \frac{1}{\sqrt{1-25x^2}} \ dx$

92. $\displaystyle\int \frac{1}{\sqrt{25-x^2}} \ dx$

93. $\displaystyle\int \frac{1}{x^2+25} \ dx$

94. $\displaystyle\int \frac{1}{25x^2+1} \ dx$

95. $\displaystyle\int_0^{\ln 4} x^2 \cosh x \ dx$

96. $\displaystyle\int \frac{1}{x\sqrt{9-\ln^2 x}} \ dx$

97. $\displaystyle\int_0^{\frac{\pi}{4}} x\cos x - x \sin x \ dx$

98. $\displaystyle\int \frac{e^{3x}}{1+e^{2x}}\ dx$

99. $\displaystyle\int x\sin^3 x\cos^2 x\ dx$

100. $\displaystyle\int \arctan\left(\frac{1}{x}\right)\ dx$

101. $\displaystyle\int \frac{1}{(4-x^2)^{\frac{3}{2}}}\ dx$

102. $\displaystyle\int x\arctan(3x)\ dx$

103. $\displaystyle\int \arcsin x\frac{\ln(\arcsin x)}{\sqrt{1-x^2}}\ dx$

104. $\displaystyle\int_1^e \ln x\ dx$

105. $\displaystyle\int \frac{\ln(2x^5)}{x^2}\ dx$

106. $\displaystyle\int \ln^2(x^{20})\ dx$

107. $\displaystyle\int \tanh(7x)\ dx$

108. $\displaystyle\int \sqrt{x}\ln(x^3)\ dx$

109. $\displaystyle\int \frac{1}{(x^2+4)^{\frac{3}{2}}}\ dx$

110. $\displaystyle\int e^x\sin^2(e^x)\cos^2(e^x)\ dx$

111. $\displaystyle\int \frac{e^x}{\sqrt{e^{2x}+9}}\ dx$

112. $\displaystyle\int \sin^5 x\cos^2 x\ dx$

113. $\displaystyle\int \sin^2 x\cos^3 x\ dx$

114. $\displaystyle\int e^x\cosh(2-e^x)\ dx$

115. $\displaystyle\int \sec^6 x\tan^2 x\ dx$

116. $\displaystyle\int \sin^2 x\tan^2 x\ dx$

117. $\displaystyle\int \frac{\sinh x}{\sqrt{16-\cosh^2 x}}\ dx$

118. $\displaystyle\int_0^1 x\tan^{-1}(x^2)\ dx$

119. $\displaystyle\int \tan^5 x\sec^3 x\ dx$

120. $\displaystyle\int \frac{x^2}{x^6+1}\ dx$

121. $\displaystyle\int_1^{e^2} x\ln\sqrt{x}\ dx$

122. $\displaystyle\int \frac{x^2}{(1-x^2)^{\frac{3}{2}}}\ dx$

123. $\displaystyle\int_1^e (\ln x)^2\ dx$

124. $\displaystyle\int_0^{\sqrt{3}} \frac{1}{\sqrt{4-x^2}}+\frac{1}{x^2+9}\ dx$

125. $\displaystyle\int_{\frac{\pi}{12}}^{\frac{\pi}{6}} x\cos(2x)\ dx$

126. $\displaystyle\int \frac{x^4}{\sqrt{9x^{10}+1}}\ dx$

127. $\displaystyle\int x^{13}\sqrt{x^7+1}\ dx$

128. $\displaystyle\int x^5 e^{x^2}\ dx$

129. $\displaystyle\int \frac{x^2}{\sqrt{16-x^2}}\ dx$

130. $\displaystyle\int x\sqrt{x+1}\ dx$

131. $\displaystyle\int \frac{x^7}{(7-x^4)^{\frac{3}{2}}}\ dx$

132. $\displaystyle\int x^3\sqrt{9-x^2}\ dx$

133. $\displaystyle\int \frac{\sqrt{x^2-4}}{x}\ dx$

134. $\displaystyle\int \frac{x^2}{x^2+3}\ dx$

135. $\displaystyle\int_{-3}^{3} \sqrt{9-x^2}\ dx$

136. $\displaystyle\int \sqrt{1-4x^2}\ dx$

137. $\displaystyle\int \frac{1}{x^2\sqrt{x^2+4}}\ dx$

138. $\displaystyle\int \sinh^{-1} x\ dx$

139. $\displaystyle\int_{0}^{\frac{\ln 7}{2}} \sinh(2x)\ dx$

140. $\displaystyle\int (e^x + \cos x)^2\ dx$

141. $\displaystyle\int_{1}^{e} \sqrt{x}\ln x\ dx$

142. $\displaystyle\int \frac{(e^x-1)e^x}{e^{2x}+1}\ dx$

143. $\displaystyle\int \frac{\sin^3 x}{\sqrt{\cos x}}\ dx$

144. $\displaystyle\int \frac{x+3}{\sqrt{4-x^2}}\ dx$

145. $\displaystyle\int \sin(\ln x))\ dx$

146. $\displaystyle\int x \arcsin x\ dx$

147. $\displaystyle\int (\arcsin x)^2\ dx$