Math 180 Review - Answer Key

updated December 20, 2013

1. ∞
2. 1
3. 1
4. 2
5. 2
6. DNE
7. DNE
8. 0
9. $\frac{1}{2}$
10. DNE
11. ∞
12. 1
13. 12
14. $\frac{1}{6}$
15. $\frac{3}{2}$
16. 0
17. 3
18. $\frac{1}{6}$
19. 0
20. 1
21. e^{-3}
22. 2
23. 0
24. $-\frac{2}{3}$
25. no
26. no
27. no
28. yes
29. R: $x = 0$
30. NR: $x = 2$
31. none
32. yes
33. no
34. yes
35. $\delta \leq \frac{0.1}{3}$
36. $\delta = \frac{0.01}{3}$
37. $\delta = 0.006$
38. proof
39. proof
40. proof
41. $x\,(2\sin 3x + 3x\cos 3x)$
42. $\frac{2x-(12x^2+3)\arctan 2x}{x^4(4x^2+1)}$
43. $\frac{2x}{x^2-1}$
44. $\frac{e^{-3x}(1-6x)}{2\sqrt{x}}$
45. $-\frac{\cos x+\sin x \arcsin x\sqrt{1-x^2}}{\sqrt{1-x^2}(\arcsin x)^2}$
46. $\frac{\sec^2(\ln x)}{x}$
47. $-e^{-2x}(\sin x + 2\cos x)$
48. $\frac{x\ln x-\arcsin x\sqrt{1-x^2}}{x\sqrt{1-x^2}(\ln x)^2}$
49. $\frac{4e^{4x}}{1+e^{8x}}$
50. $\frac{e^{5x}(5x\ln x+1}{x}$
51. $\frac{2xe^{x^2}}{1+e^{2x^2}}$
52. $-\frac{\left(x+\sqrt{1-x^2}\arcsin x\right)}{\sqrt{1-x^2}}$
53. $\cos(x2^x) - x2^x(1 + x\ln 2)\sin(x2^x)$
54. $-\frac{\cos x+x\ln x\sin x}{x\ln x\sqrt{(\ln x)^2-(\cos(x))^2}}$
55. $\frac{e^{-\sin x}\left(1-(1+x^2)\cos(x)\arctan x\right)}{1+x^2}$
56. $\frac{(\ln x-1)\tan x+x\ln x\sec^2 x}{(\ln x)^2}$
57. $e^x\,(1 + (x+1)\ln x)$
58. $\frac{e^x(1+x\ln x)\sec^2(\ln xe^x)}{x}$

59. $\frac{1-\ln x}{x\sqrt{x^2-(\ln x)^2}}$

60. $-e^x \tan(e^x)$

61. $\frac{1}{x \ln x \ln 2 \ln 7}$

62. $\frac{1}{x \ln 7 \ln 3}$

63. $-7e^{7x} \tan(e^{7x}) \cos \ln \cos e^{7x}$

64. $\left(\frac{1}{2x-3} + \frac{1}{3x-2} + \frac{7}{x-1}\right) \sqrt{2x-3} \sqrt[3]{3x-2}(x-1)^7$

65. $\left(\frac{x}{x^2+1} + \frac{1}{2(x-4)} + \frac{1}{3(x-2)} + \frac{2x}{3(x^2+4)}\right) \sqrt{\frac{x^2+1}{x-4}} \sqrt[3]{\frac{x-2}{x^2+4}}$

66. $648^x \ln 648$

67. $2^{3^x} 3^x \ln 2 \ln 3$

68. $x^x(1 + \ln x)$

69. $\sin^x x \left(\ln \sin x + x \cot x\right)$

70. $u^v \left(\frac{v}{u}\frac{du}{dx} + \frac{dv}{dx} \ln u\right)$

71. $\lim_{\Delta x \to 0} \frac{(x+\Delta x)^3 - 7(x+\Delta x) + 2 - (x^3 - 7x + 2)}{\Delta x} = 3x^2 - 7$

72. $\lim_{\Delta x \to 0} \frac{\sqrt{x+\Delta x+3} - \sqrt{x+3}}{\Delta x} = \frac{1}{2\sqrt{x+3}}$

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

74. $\lim_{\Delta x \to 0} \frac{\frac{1}{\sqrt{x+\Delta x}} - \frac{1}{\sqrt{x}}}{\Delta x} = \frac{-1}{2\sqrt{x^3}}$

75. $\lim_{x \to 2} \frac{x^3 - 1 - 7}{x-2} =$

76. $\lim_{x \to 5} \frac{\sqrt{x-1} - 2}{x-5} =$

77. $\lim_{x \to -1} \frac{\frac{1}{x+2} - 1}{x+1} =$

78. $\lim_{x \to 1} \frac{\frac{1}{\sqrt{x}} - 1}{x-1} =$

79. Max: $(-2, 18)$, Min: $(2, -14)$

80. Max: $(3, 12)$, Min: $(1, 2)$

81. Max: $(0, 0)$, Min: $(-1, -3)$

82. eps file

83. eps file

84. eps file

85. a) N/A, b) N/A, c) $c = 0$

86. a) N/A, b) c=0, c) N/A

87. $x - 4y = -2$

88. $16x + 4y = -31$

89. a) 28.9 ft, b) $\frac{27}{16}$ s, c) $v = -43$ $\frac{ft}{s}$, $spd = 43$ $\frac{ft}{s}$ d) -5 $\frac{ft}{s}$

90. $\frac{dy}{dx} = \frac{2x-y}{x+2y}$, $\frac{d^y}{dx^2} = 0$

91. 92.4 $\frac{mi}{h}$

92. $\frac{dA}{dt} = \frac{24}{\sqrt[3]{\frac{45}{\pi}}}$ $\frac{cm^2}{s}$

93. $\frac{d\theta}{dt} = \frac{12}{65}$ $\frac{rad}{s}$

94. Use all wire on square

95. $2\ in \times 2\ in \times 2\ in$

96. $(1, 1)$

97. $r = \sqrt[3]{\frac{100}{\pi}}\ cm$, $h = \frac{350}{\pi\left(\sqrt[3]{100/\pi}\right)^2}\ cm$

98. $\sqrt{304}\ ft$

99. 9.95

100. $\pm 0.0124 = \pm 1.24\%$

101. $f = A$, $f' = C$, $F'' = B$

102. $\frac{-1}{\ln x} + C$

103. $2 - \frac{1}{e}$

104. $\frac{1}{2} \ln |\sec x^2 + \tan x^2| + C$

105. $\frac{pi}{4} + 2 \ln |\sqrt{2} + 1| + 1$

106. $\frac{4}{45}(3x-1)^{5/2} + \frac{4}{27}(3x-1)^{3/2} + C$

107. 0

108. $\frac{1}{2} \ln |1 + \sec 2x| + C$

109. $\frac{\pi}{6} - \arcsin \frac{1}{3}$

110. $3(e^x + 1)^{2/3} + C$

111. $\frac{1}{2}$

112. $\frac{1}{2} \arctan x^2 + C$

113. $\frac{217}{3}$

114. $x - \arctan x + C$

115. $\frac{769}{112}$

116. $-\ln |2 + \cot x| + C$

117. $\frac{8}{\ln 5}$

118. $\arctan(e^x) + C$

119. $\frac{1}{2}$

120. 42

121. $\frac{1}{96}$

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

123. $s(t) = 2.665t^2 + 4$

124. Avg $= 4$, $c = 2$

125. $\frac{df}{dx} = -2x \sin(e^{x^2})$