Math 115 – The List of Problems for the gateway exam

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

2. $f(x) = -\frac{2}{3}x^3 + x^2 + 12x + 9$

3. $f(x) = x^{\frac{7}{3}} - 8x^{\frac{4}{3}} + 56$

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

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

6. $g(t) = t^{\frac{2}{3}} - t^{-\frac{1}{4}} + \pi$

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

8. $h(r) = 3r^2 + 4r + \frac{1}{r}$

9. $f(x) = x^4 + 4x^3 + 10$

10. $f(x) = 12x^3 - 6x + 3 - \frac{2}{x} + 4x^{\frac{3}{4}}$

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

12. $f(x) = 3x^{\frac{2}{3}} - 6x^{\frac{4}{3}}$

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

14. $g(t) = t^{\frac{4}{3}} - 4t^{\frac{1}{3}} + 1$

15. $f(t) = 2t^3 + 6t - \frac{4}{t^2}$

16. $f(x) = x^{\frac{5}{4}} - 10x^{\frac{1}{4}} + 1$

17. $f(x) = 2x^{-1} + 3x^2$

18. $f(x) = \frac{1}{x} + \frac{1}{x^2} + \frac{1}{x^3}$

19. $f(y) = 4y^3 - 6y^{\frac{2}{3}} + 7y$

20. $p(x) = 16x^3 + \frac{17}{\sqrt{x}} - 10x^{3.1416} + \pi^2$

21. $g(t) = (t^2 - 1)(t^4 + t^2 + 1)$

22. $f(x) = (x^2 + 2x + 5)(x^3 + 1)$

23. $h(t) = (t^2 + 1)\sqrt{t}$

24. $s(t) = (t + 1)(t^2 - 3)(t^3 - 2)$

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

26. $h(x) = (x^{\frac{4}{5}} + x^{-\frac{4}{5}})(5x^4 - \pi^3)$

27. $f(x) = (x^{\frac{2}{3}} - x^{-\frac{1}{3}})(3x^2 - 6\pi)$

28. $g(x) = (x^3 - 3x^{\frac{1}{3}} + 5)(x^4 + 5x^2 - 2\sqrt{x})$

29. $r(u) = 2u(u^2 + 4)$

30. $f(x) = (x^4 + 6x^2 + 1)(x^3 + 3x)$

31. $f(x) = (x^3 + 3x^2 + 2)(x^5 + 6x^2 - 3x + 5)$

32. $h(w) = (w^{-\frac{1}{3}} - 3w^6)(4w^2 - 2w + 7)$

33. $g(x) = (x^4 - 16)(x^2 - 4)$

34. $g(t) = (1 - t)(t^2 + 1)$

35. $f(x) = (1 - x^2)(2x^2 + x)$

36. $g(y) = (\sqrt{y} - 2)(1 - y^2)$

37. $u(x) = (x^2 - 1)(x^2 + 1)(x - 2)$

38. $F(x) = (3x^2 + 7x - \pi^2)\left(\frac{x^4}{3} - \frac{x^2}{\sqrt{10}}\right)$

39. $G(y) = (3\pi y - 4)(3\pi y + 6)$

40. $H(t) = (2t - 1)\left(4 - .05t + \frac{t^{\frac{3}{2}}}{9.6}\right)$

41. $f(x) = \frac{x-3}{x^2+7}$

42. $k(x) = \frac{3x-2}{x-1}$

43. $f(x) = \frac{x+1-\sqrt{x}}{x}$

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

45. $f(x) = \frac{x^3-1}{\sqrt[3]{x}}$

46. $f(x) = \frac{3x}{1-2x^2}$

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

48. $f(x) = \frac{1}{3-x}$

49. $g(x) = \frac{3x^2+1}{x+2}$

50. $f(t) = \frac{4t^2+t}{3t+2}$

51. $k(x) = \frac{x^3-2x+4}{2x^2+1}$

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

53. $g(t) = \frac{1+t+t^2}{t-t^3}$

54. $g(t) = \frac{4+t^2}{2-t}$

55. $h(x) = \frac{(x-1)(x^2+x+1)}{x+1}$

56. $g(y) = \frac{y-2}{y^2+1}$

57. $r(u) = \frac{5+u^2}{1-u^3}$

58. $g(t) = \frac{t^3-3t-2}{t^2+1}$

59. $f(x) = \frac{3x}{\sqrt{x+2}}$

60. $m(y) = \frac{1-4y^2}{6y^2+1}$

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

62. $f(x) = \sqrt[3]{x^4-7x}$

63. $u(t) = \frac{1}{\sqrt{t^2+2t-1}}$

64. $f(x) = (1+(x^2+2)^{\frac{1}{2}})^{\frac{1}{3}}$

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

66. $h(w) = (1+\sqrt{w^3+3})^4$

67. $f(x) = (5x^3+5x)^9$

68. $h(s) = \frac{1}{\sqrt{s^2-s^4}}$

69. $f(t) = \frac{1}{\sqrt{3t^2+2t+2}}$

70. $h(s) = (1+\sqrt{s})^{-\frac{1}{2}}$

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

72. $f(x) = (x^2+1)^8$

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73. $f(x) = \sqrt{3x^2 - x}$

74. $f(x) = (x^2 + 1)^{-10}$

75. $f(x) = \sqrt{1 + x^3}$

76. $g(r) = \frac{1}{\sqrt{r^3 + 2r}}$

77. $h(s) = \frac{1}{\sqrt{1 - s^3}}$

78. $m(u) = \sqrt{1 + \sqrt{u}}$

79. $f(t) = \frac{1}{\sqrt{1 - t^2}}$

80. $h(x) = \sqrt{3x^2 - 2x + 1}$

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

82. $g(t) = (t^3 - 1)^4(1 + t + t^2)^{-4}$

83. $h(s) = [(s + 2)^3(2 - s)]^3$

84. $k(r) = [(r + r^3)(r - r^3)]^4$

85. $g(t) = (t^3 - \pi^3)^2(t^2 + \pi^2)^3$

86. $h(y) = (y - 1)^4(1 + y + y^2)^4$

87. $h(x) = \sqrt{(x + 1)^2(2x + 3)}$

88. $f(x) = (1 - 2x)^3(2x^2 - x)^4$

89. $h(x) = [(4 - x^2)(9 - x)]^{\frac{1}{3}}$

90. $g(s) = (s - 3)^2(9 + s^2)^{-3}$

91. $f(x) = (x - 7)^{\frac{1}{3}}(x + 2)^{\frac{1}{5}}$

92. $g(t) = \frac{t}{\sqrt{1 + t^2}}$

93. $h(s) = \sqrt{\frac{s^2 + s - 2}{s + 2}}$

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

95. $f(x) = \left(\frac{x - 3}{x^2 + 7}\right)^4$

96. $f(x) = \frac{(7x + 1)^{\frac{4}{3}}}{x^2}$

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97. $f(x) = \left(\frac{2t-1}{4t-5}\right)^{\frac{1}{3}}$

98. $g(u) = \frac{2u-3}{\sqrt{u^2-3u+4}}$

99. $w(t) = \frac{t^2-49}{\sqrt{t+7}}$

100. $F(y) = \left(\frac{1-3y}{4+y-2y^2}\right)^2$