

Math 104 – Solutions for the gateway exam

1. $f(3) = 22$
2. $g(a + h) = 2a^2 + 4ah + 2h^2 - 2$
3. $f(c + 1) = \frac{6c + 5}{c + 1}$
4. $f(b - 1) = b^2 - 8b + 7$
5. $v(a + h) = 3a + 3h + 2$
6. $h(j - 2) = -\frac{1}{2}j^2 + j + 3$
7. $f(-1) = -3$
8. $g(d - 2) = 8d - 19$
9. $f(m + k) = \frac{m + k + 2}{m + k - 2}$
10. $f(t + 2) = 9t + 19$
11. $r = \frac{S - P}{St}$
12. $x = \frac{8r - 7}{2r + 8}$
13. $f = \frac{d_0 d_1}{d_0 + d_1}$
14. $x = \frac{3d - ab}{2a - b}$
15. $v_1 = \frac{v_2 c^2 - v c^2}{v v_2 - c^2}$
16. $y = \frac{1}{2x}$
17. $y = \frac{x}{x - 1}$
18. $T_w = T_f - \frac{Q_w}{m_w c_w}$
19. $x = \frac{y - y_1}{m} + x_1$
20. $x = a - \frac{ay}{b}$
21. $x = 15625$
22. $x = 2, \frac{5}{2}, 3$
23. No real solutions
24. $x = 1, \frac{-13 \pm 5i\sqrt{3}}{2}$
25. $t = 0, 2$
26. $x = 8, \frac{7 \pm 3i\sqrt{3}}{2}$
27. No real solutions
28. $p = 144$
29. $q = -4, 0, \frac{1}{2}$
30. $z = 0, \frac{4}{3}, -\frac{2}{5}$
31. $x = 40$
32. $y = 2, 6$
33. $b = 5, 7$
34. $c = 3$

35. $x = 7$
36. $m = 9$
37. $x = \frac{5}{2}$
38. $t = -6$
39. $r = 5$
40. $(x = 8)$
41. $a = \pm\sqrt{2}, \pm\sqrt{7}$
42. $x = \pm 2, \pm\sqrt{\frac{3}{2}}$
43. $g = -\frac{1}{8}$
44. $u = \pm\sqrt{\frac{1}{2}}, \pm\sqrt{\frac{2}{3}}$
45. $x = \pm\sqrt{\frac{5}{3}}$ multiplicity 2
46. $f = 2$
47. $x = -3, -\frac{8}{3}$
48. $x = \pm\sqrt{2}, \pm\sqrt{6}$
49. $g = 1$
50. $x = \frac{1}{3}, \frac{3}{2}$
51. $x = -1, 7$
52. $t = 2, 3$
53. $r = 2$
54. $x = 9$
55. $\frac{9}{e-1}$
56. $m = -\frac{3}{4}, \frac{1}{2}$
57. $p = \frac{1}{4}$
58. $x = 0, 5$
59. $x = 2$
60. $(x = 2)$
61. $(f - g)(4) = 18$
62. $(\frac{g}{f})(a) = \frac{\sqrt{a} - 2}{a^2 + 2}$
63. $3g(c) = 3\sqrt{c} - 6$
64. $f(g(a + h)) = a + h - 4\sqrt{a + h} + 6$
65. $(f + g)(x) = x^2 + \sqrt{x}$
66. $2f(1) = 6$
67. $g(f(x + y)) = \sqrt{x^2 + 2xy + y^2 + 2} - 2$
68. $(gf)(x) = x^2\sqrt{x} + 2\sqrt{x} - 2x^2 - 4$
69. $g(f(\sqrt{2})) = 0$
70. $(g - f)(9) = -82$
71. $f(g(x)) = 3x + 1$
72. $f(g(x)) = \sqrt{\frac{1}{x+3}}$
73. $f(g(x)) = \frac{x^2 - 2x + 1}{x^2 + 2x + 1}$
74. $f(g(x)) = x^2 - 2xc + c^2 + 4x - 4c - 5$
75. $f(g(x)) = x^2 - 5x + 1$
76. $f(g(x)) = \frac{4}{x} - \frac{4x}{3}$
77. $f(g(x)) = x + x^{3/2}$
78. $f(g(x)) = 5x^8 - 3x^2$
79. $f(g(x)) = 18x + 9 + \frac{1}{x}$

80. $f(g(x)) = \sqrt{5x^2 - 2} + 1$

81. $g^{-1}(t) = \frac{1}{t} + 1$

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

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

84. $u^{-1}(t) = \frac{16}{3t^2}$

85. $g^{-1}(y) = (y - 1)^2$

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

87. $m^{-1}(t) = \frac{5}{2(t - 2)}$

88. $y^{-1}(x) = \left(\frac{5x + 1}{1 - x}\right)^{1/3}$

89. $f^{-1}(s) = \frac{-3}{2s} - \frac{5}{2}$

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

91. $\frac{x - 1}{x + 1}$

92. $\frac{4x + 1}{x^2 - 1}$

93. $\frac{x - 3}{\sqrt{2x - 1}}$

94. $\frac{y}{x + z}$

95. $\frac{x}{x - 2}$

96. $2x^2 + 1$

97. $\frac{x + 3}{x - 2}$

98. $\frac{x^2 - xy - y^2}{x^2 + xy}$

99. $\frac{h}{(x + h + 1)(x + 1)}$

100. $\frac{-x + 2}{x^2 + 1}$