

Functions 2 – Evaluating Functions A: SOLUTIONS

Any binomial squared is shown simplified, all other multiplication of polynomials is shown in full.

1. $f(3)$

$$f(x) = x^2 - 3$$

$$f(3) = 3^2 - 3$$

$$f(3) = 9 - 3$$

$$f(3) = 6$$

2. $g(7)$

$$g(x) = x - 4$$

$$g(7) = 7 - 4$$

$$g(7) = 3$$

3. $j(-5)$

$$j(x) = 2x + 5$$

$$j(-5) = 2(-5) + 5$$

$$j(-5) = -10 + 5$$

$$j(-5) = -5$$

4. $k(-7)$

$$k(x) = x^2 + 3x - 5$$

$$k(-7) = (-7)^2 + 3(-7) - 5$$

$$k(-7) = 49 - 21 - 5$$

$$k(-7) = 33$$

5. $h(-3)$

$$h(x) = x^2 + 7$$

$$h(-3) = (-3)^2 + 7$$

$$h(-3) = 9 + 7$$

$$h(-3) = 16$$

6. $f(-10)$

$$f(x) = x^2 - 3$$

$$f(-10) = (-10)^2 - 3$$

$$f(-10) = 100 - 3$$

$$f(-10) = 97$$

7. $k(15)$

$$k(x) = x^2 + 3x - 5$$

$$k(15) = (15)^2 + 3(15) - 5$$

$$k(15) = 225 + 45 - 5$$

$$k(15) = 265$$

8. $h\left(-\frac{1}{2}\right)$

$$h(x) = x^2 + 7$$

$$h\left(-\frac{1}{2}\right) = \left(-\frac{1}{2}\right)^2 + 7$$

$$h\left(-\frac{1}{2}\right) = \frac{1}{4} + 7$$

$$h\left(-\frac{1}{2}\right) = 7\frac{1}{4}$$

9. $j\left(\frac{2}{3}\right)$

$$j(x) = 2x + 5$$

$$j\left(\frac{2}{3}\right) = 2\left(\frac{2}{3}\right) + 5$$

$$j\left(\frac{2}{3}\right) = \frac{4}{3} + 5$$

$$j\left(\frac{2}{3}\right) = 6\frac{1}{3}$$

10. $k\left(\frac{3}{4}\right)$

$$k(x) = x^2 + 3x - 5$$

$$k\left(\frac{3}{4}\right) = \left(\frac{3}{4}\right)^2 + 3\left(\frac{3}{4}\right) - 5$$

$$k\left(\frac{3}{4}\right) = \frac{9}{16} + \frac{9}{4} - 5$$

$$k\left(\frac{3}{4}\right) = -2\frac{3}{16}$$

11. $f(2.5)$

$$f(x) = x^2 - 3$$

$$f(2.5) = (2.5)^2 - 3$$

$$f(2.5) = 6.25 - 3$$

$$f(2.5) = 3.25$$

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12. $g(1.5)$

$$g(x) = x - 4$$

$$g(1.5) = 1.5 - 4$$

$$g(1.5) = -2.5$$

13. $h(-2.3)$

$$h(x) = x^2 + 7$$

$$h(-2.3) = (-2.3)^2 + 7$$

$$h(-2.3) = 5.29 + 7$$

$$h(-2.3) = 12.29$$

14. $j(4.7)$

$$j(x) = 2x + 5$$

$$j(4.7) = 2(4.7) + 5$$

$$j(4.7) = 9.4 + 5$$

$$j(4.7) = 14.4$$

15. $k(-2.5)$

$$k(x) = x^2 + 3x - 5$$

$$k(-2.5) = (-2.5)^2 + 3(-2.5) - 5$$

$$k(-2.5) = 6.25 - 7.5 - 5$$

$$k(-2.5) = -6.25$$

16. $j(a)$

$$j(x) = 2x + 5$$

$$j(a) = 2(a) + 5$$

$$j(a) = 2a + 5$$

17. $k(a+8)$

$$k(x) = x^2 + 3x - 5$$

$$k(a+8) = (a+8)^2 + 3(a+8) - 5$$

$$(a+8)^2 = a^2 + 16a + 64$$

$$k(a+8) = a^2 + 16a + 64 + 3a + 24 - 5$$

$$k(a+8) = a^2 + 19a + 83$$

18. $h(3a+2)$

$$h(x) = x^2 + 7$$

$$h(3a+2) = (3a+2)^2 + 7$$

$$(3a+2)^2 = 9a^2 + 12a + 4$$

$$h(3a+2) = 9a^2 + 12a + 4 + 7$$

$$h(3a+2) = 9a^2 + 12a + 11$$

19. $j(a+3)$

$$j(x) = 2x + 5$$

$$j(a+3) = 2(a+3) + 5$$

$$j(a+3) = 2a + 6 + 5$$

$$j(a+3) = 2a + 11$$

20. $j(a-3)$

$$j(x) = 2x + 5$$

$$j(a-3) = 2(a-3) + 5$$

$$j(a-3) = 2a - 6 + 5$$

$$j(a-3) = 2a - 1$$

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21. $h(x+4)$

$$h(x) = x^2 + 7$$

$$h(x+4) = (x+4)^2 + 7$$

$$(x+4)^2 = x^2 + 8x + 16$$

$$h(x+4) = x^2 + 8x + 16 + 7$$

$$h(x+4) = x^2 + 8x + 23$$

22. $j(x-5)$

$$j(x) = 2x + 5$$

$$j(x-5) = 2(x-5) + 5$$

$$j(x-5) = 2x - 10 + 5$$

$$j(x-5) = 2x - 5$$

23. $h(2x+3)$

$$h(x) = x^2 + 7$$

$$h(2x+3) = (2x+3)^2 + 7$$

$$(2x+3)^2 = 4x^2 + 12x + 9$$

$$h(2x+3) = 4x^2 + 12x + 9 + 7$$

$$h(2x+3) = 4x^2 + 12x + 16$$

24. $k(2x+5)$

$$k(x) = x^2 + 3x - 5$$

$$k(2x+5) = (2x+5)^2 + 3(2x+5) - 5$$

$$(2x+5)^2 = 4x^2 + 20x + 25$$

$$k(2x+5) = 4x^2 + 20x + 25 + 6x + 15 - 5$$

$$k(2x+5) = 4x^2 + 26x + 35$$

25. $j(x-4)$

$$j(x) = 2x + 5$$

$$j(x-4) = 2(x-4) + 5$$

$$j(x-4) = 2x - 8 + 5$$

$$j(x-4) = 2x - 3$$

26. $f(4x)$

$$f(x) = x^2 - 3$$

$$f(4x) = (4x)^2 - 3$$

$$f(4x) = 16x^2 - 3$$

27. $j(2r)$

$$j(x) = 2x + 5$$

$$j(2r) = 2(2r) + 5$$

$$j(2r) = 4r + 5$$

28. $k(y+5)$

$$k(x) = x^2 + 3x - 5$$

$$k(y+5) = (y+5)^2 + 3(y+5) - 5$$

$$(y+5)^2 = y^2 + 10y + 25$$

$$k(y+5) = y^2 + 10y + 25 + 3y + 15 - 5$$

$$k(y+5) = y^2 + 13x + 35$$

29. $g(5x-6)$

$$g(x) = x - 4$$

$$g(5x-6) = 5x - 6 - 4$$

$$g(5x-6) = 5x - 10$$

30. $g(3r-5)$

$$g(x) = x - 4$$

$$g(3r-5) = 3r - 5 - 4$$

$$g(3r-5) = 3r - 9$$

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31. $h(x+10)$

$$h(x) = x^2 + 7$$

$$h(x+10) = (x+10)^2 + 7$$

$$(x+10)^2 = x^2 + 20x + 100$$

$$h(x+10) = x^2 + 20x + 100 + 7$$

$$h(x+10) = x^2 + 20x + 107$$

32. $f(x-4)$

$$f(x) = x^2 - 3$$

$$f(x-4) = (x-4)^2 - 3$$

$$(x-4)^2 = x^2 - 8x + 16$$

$$f(x-4) = x^2 - 8x + 16 - 3$$

$$f(x-4) = x^2 - 8x + 13$$

33. $k(x+y)$

$$k(x) = x^2 + 3x - 5$$

$$k(x+y) = (x+y)^2 + 3(x+y) - 5$$

$$(x+y)^2 = x^2 + 2xy + y^2$$

$$k(x+y) = x^2 + 2xy + y^2 + 3x + 3y - 5$$

34. $f(2x+5)$

$$f(x) = x^2 - 3$$

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

$$(2x+5)^2 = 4x^2 + 20x + 25$$

$$f(2x+5) = 4x^2 + 20x + 25 - 3$$

$$f(2x+5) = 4x^2 + 20x + 22$$

35. $g(x^2+7)$

$$g(x) = x - 4$$

$$g(x^2+7) = x^2 + 7 - 4$$

$$g(x^2+7) = x^2 + 3$$

36. $j(2x+5)$

$$j(x) = 2x + 5$$

$$j(2x+5) = 2(2x+5) + 5$$

$$j(2x+5) = 4x + 10 + 5$$

$$j(2x+5) = 4x + 15$$

37. $k(x^2+3x-5)$

$$k(x) = x^2 + 3x - 5$$

$$k(x^2+3x-5) = (x^2+3x-5)^2 + 3(x^2+3x-5) - 5$$

$$(x^2+3x-5)^2 = x^4 + 3x^3 - 5x^2 + 3x^3 + 9x^2 - 15x - 5x^2 - 15x + 25$$

$$(x^2+3x-5)^2 = x^4 + 6x^3 - x^2 - 30x + 25$$

$$k(x^2+3x-5) = x^4 + 6x^3 - x^2 - 30x + 25 + 3x^2 + 9x - 15 - 5$$

$$k(x^2+3x-5) = x^4 + 6x^3 + 2x^2 - 21x + 5$$

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38. $h(x^2 + 7)$

$$h(x) = x^2 + 7$$

$$h(x^2 + 7) = (x^2 + 7)^2 + 7$$

$$(x^2 + 7)^2 = x^4 + 14x^2 + 49$$

$$h(x^2 + 7) = x^4 + 14x^2 + 49 + 7$$

$$h(x^2 + 7) = x^4 + 14x^2 + 56$$

39. $f(x^2 - 3)$

$$f(x) = x^2 - 3$$

$$f(x^2 - 3) = (x^2 - 3)^2 - 3$$

$$(x^2 - 3)^2 = x^4 - 6x^2 + 9$$

$$f(x^2 - 3) = x^4 - 6x^2 + 9 - 3$$

$$f(x^2 - 3) = x^4 - 6x^2 + 6$$

40. $h(x^2 + 3x - 5)$

$$h(x) = x^2 + 7$$

$$h(x^2 + 3x - 5) = (x^2 + 3x - 5)^2 + 7$$

$$(x^2 + 3x - 5)^2 = x^4 + 3x^3 - 5x^2 + 3x^3 + 9x^2 - 15x - 5x^2 - 15x + 25$$

$$(x^2 + 3x - 5)^2 = x^4 + 6x^3 - x^2 - 30x + 25$$

$$h(x^2 + 3x - 5) = x^4 + 6x^3 - x^2 - 30x + 25 + 7$$

$$h(x^2 + 3x - 5) = x^4 + 6x^3 - x^2 - 30x + 32$$

41. $f(x - 6)$

$$f(x) = x^2 - 3$$

$$f(x - 6) = (x - 6)^2 - 3$$

$$(x - 6)^2 = x^2 - 12x + 36$$

$$f(x - 6) = x^2 - 12x + 36 - 3$$

$$f(x - 6) = x^2 - 12x + 33$$

42. $k(x^2)$

$$k(x) = x^2 + 3x - 5$$

$$k(x^2) = (x^2)^2 + 3(x^2) - 5$$

$$k(x^2) = x^4 + 3x^2 - 5$$

43. $j(2x - 7y)$

$$j(x) = 2x + 5$$

$$j(2x - 7y) = 2(2x - 7y) + 5$$

$$j(2x - 7y) = 4x - 14y + 5$$

$$j(2x - 7y) = 4x - 14y + 5$$

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44. $k(3x + 4r)$

$$k(x) = x^2 + 3x - 5$$

$$k(3x + 4r) = (3x + 4r)^2 + 3(3x + 4r) - 5$$

$$(3x + 4r)^2 = 9x^2 + 24xr + 16r^2$$

$$k(3x + 4r)^2 = 9x^2 + 24xr + 16r^2 + 9x + 12r - 5$$

45. $g(2x^2 - 7r^2)$

$$g(x) = x - 4$$

$$g(2x^2 - 7r^2) = 2x^2 - 7r^2 - 4$$

46. $f(3r^2 - 2y)$

$$f(x) = x^2 - 3$$

$$f(3r^2 - 2y) = (3r^2 - 2y)^2 - 3$$

$$(3r^2 - 2y)^2 = 9r^4 - 12r^2y + 4y^2$$

$$f(3r^2 - 2y) = 9r^4 - 12r^2y + 4y^2 - 3$$

47. $g(-x^2 + 4)$

$$g(x) = x - 4$$

$$g(-x^2 + 4) = -x^2 + 4 - 4$$

$$g(-x^2 + 4) = -x^2$$

48. $k(-x)$

$$k(x) = x^2 + 3x - 5$$

$$k(-x) = (-x)^2 + 3(-x) - 5$$

$$k(-x) = x^2 - 3x - 5$$

49. $k(-x^2)$

$$k(x) = x^2 + 3x - 5$$

$$k(-x^2) = (-x^2)^2 + 3(-x^2) - 5$$

$$k(-x^2) = x^4 - 3x^2 - 5$$

50. $k(x^2 - 7y)$

$$k(x) = x^2 + 3x - 5$$

$$k(x^2 - 7y) = (x^2 - 7y)^2 + 3(x^2 - 7y) - 5$$

$$(x^2 - 7y)^2 = x^4 - 14x^2y + 49y^2$$

$$k(x^2 - 7y) = x^4 - 14x^2y + 49y^2 + 3x^2 - 21y - 5$$

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51. $f(x - y - z)$

$$f(x) = x^2 - 3$$

$$f(x - y - z) = (x - y - z)^2 - 3$$

$$(x - y - z)^2 = x^2 - xy - xz - xy + y^2 + yz - xz + yz + z^2$$

$$f(x - y - z) = x^2 - xy - xz - xy + y^2 + yz - xz + yz + z^2 - 3$$

52. $g(x + 4)$

$$g(x) = x - 4$$

$$g(x + 4) = x + 4 - 4$$

$$g(x + 4) = x$$

53. $j\left(\frac{1}{2}x^2 + 2x - 5\right)$

$$j(x) = 2x + 5$$

$$j\left(\frac{1}{2}x^2 + 2x - 5\right) = 2\left(\frac{1}{2}x^2 + 2x - 5\right) + 5$$

$$j\left(\frac{1}{2}x^2 + 2x - 5\right) = x^2 + 4x - 10 + 5$$

$$j\left(\frac{1}{2}x^2 + 2x - 5\right) = x^2 + 4x - 5$$

54. $f(0.5x - 7)$

$$f(x) = x^2 - 3$$

$$f(0.5x - 7) = (0.5x - 7)^2 - 3$$

$$(0.5x - 7)^2 = 0.25x^2 - 7x + 49$$

$$f(0.5x - 7) = 0.25x^2 - 7x + 49 - 3$$

$$f(0.5x - 7) = 0.25x^2 - 7x + 46$$

55. $k\left(-\frac{2}{3}x + 4\right)$

$$k(x) = x^2 + 3x - 5$$

$$k\left(-\frac{2}{3}x + 4\right) = \left(-\frac{2}{3}x + 4\right)^2 + 3\left(-\frac{2}{3}x + 4\right) - 5$$

$$\left(-\frac{2}{3}x + 4\right)^2 = \frac{4}{9}x^2 - \frac{16}{3}x + 16$$

$$k\left(-\frac{2}{3}x + 4\right) = \frac{4}{9}x^2 - \frac{16}{3}x + 16 - 2x + 12 - 5$$

$$k\left(-\frac{2}{3}x + 4\right) = \frac{4}{9}x^2 - \frac{22}{3}x + 23$$

$$k\left(-\frac{2}{3}x + 4\right) = \frac{4}{9}x^2 - 7\frac{1}{3}x + 23$$

56. $f(2.5x - 7y)$

$$f(x) = x^2 - 3$$

$$f(2.5x - 7y) = (2.5x - 7y)^2 - 3$$

$$(2.5x - 7y)^2 = 6.25x^2 - 35xy + 49y^2$$

$$f(2.5x - 7y) = 6.25x^2 - 35xy + 49y^2 - 3$$

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57. $g(2.7x - 3.8y)$

$$g(x) = x - 4$$

$$g(2.7x - 3.8y) = 2.7x - 3.8y - 4$$

58. $j\left(-\frac{2}{7}x^2 - 5\right)$

$$j(x) = 2x + 5$$

$$j\left(-\frac{2}{7}x^2 - 5\right) = 2\left(-\frac{2}{7}x^2 - 5\right) + 5$$

$$j\left(-\frac{2}{7}x^2 - 5\right) = -\frac{4}{7}x^2 - 10 + 5$$

$$j\left(-\frac{2}{7}x^2 - 5\right) = -\frac{4}{7}x^2 - 5$$

59. $k\left(0.78x - \frac{2}{3}y\right)$

$$k(x) = x^2 + 3x - 5$$

$$0.78x = \frac{39}{50}x$$

$$k\left(\frac{39}{50}x - \frac{2}{3}y\right) = \left(\frac{39}{50}x - \frac{2}{3}y\right)^2 + 3\left(\frac{39}{50}x - \frac{2}{3}y\right) - 5$$

$$\left(\frac{39}{50}x - \frac{2}{3}y\right)^2 = \frac{1521}{2500}x^2 - \frac{83}{150}xy + \frac{4}{9}y^2$$

$$k\left(\frac{39}{50}x - \frac{2}{3}y\right) = \frac{1521}{2500}x^2 - \frac{83}{150}xy + \frac{4}{9}y^2 + \frac{117}{50}x - 2y - 5$$

60. $h\left(x^2 - \frac{2}{6}x\right)$

$$h(x) = x^2 + 7$$

$$h\left(x^2 - \frac{2}{6}x\right) = h\left(x^2 - \frac{1}{3}x\right) = \left(x^2 - \frac{1}{3}x\right)^2 + 7$$

$$\left(x^2 - \frac{1}{3}x\right)^2 = x^4 - \frac{2}{3}x^3 + \frac{1}{9}x^2$$

$$h\left(x^2 - \frac{1}{3}x\right) = x^4 - \frac{2}{3}x^3 + \frac{1}{9}x^2 + 7$$

61. $f(x + 5y - w)$

$$f(x) = x^2 - 3$$

$$f(x + 5y - w) = (x + 5y - w)^2 - 3$$

$$(x + 5y - w)^2 = x^2 + 5xy - wx + 5xy + 25y^2 - 5wy - wx - 5wy + w^2$$

$$f(x + 5y - w) = x^2 + 25y^2 + w^2 + 10xy - 10wy - 2wx - 3$$

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62. $f(x^2 + 10x + 25)$

$$f(x) = x^2 - 3$$

$$f(x^2 + 10x + 25) = (x^2 + 10x + 25)^2 - 3$$

$$(x^2 + 10x + 25)^2 = x^4 + 10x^3 + 25x^2 + 10x^3 + 100x^2 + 250x + 25x^2 + 250x + 625$$

$$f(x^2 + 10x + 25) = x^4 + 20x^3 + 150x^2 + 500x + 625 - 3$$

$$f(x^2 + 10x + 25) = x^4 + 20x^3 + 150x^2 + 500x + 622$$

63. $j(2r - 7)$

$$j(x) = 2x + 5$$

$$j(2r - 7) = 2(2r - 7) + 5$$

$$j(2r - 7) = 4r - 14 + 5$$

$$j(2r - 7) = 4r - 9$$

64. $g(7w - 5z)$

$$g(x) = x - 4$$

$$g(7w - 5z) = 7w - 5z - 4$$

65. $k(2m + 4n - 7r)$

$$k(x) = x^2 + 3x - 5$$

$$k(2m + 4n - 7r) = (2m + 4n - 7r)^2 + 3(2m + 4n - 7r) - 5$$

$$(2m + 4n - 7r)^2 = 4m^2 + 8mn - 14mr + 8mn + 16n^2 - 28nr - 14mr - 28nr + 49r^2$$

$$k(2m + 4n - 7r) = 4m^2 + 16n^2 + 49r^2 + 16mn - 28mr - 56nr - 5$$

66. $h\left(2x + \frac{2}{7}y - \frac{3}{4}z\right)$

$$h(x) = x^2 + 7$$

$$h\left(2x + \frac{2}{7}y - \frac{3}{4}z\right) = \left(2x + \frac{2}{7}y - \frac{3}{4}z\right)^2 + 7$$

$$\left(2x + \frac{2}{7}y - \frac{3}{4}z\right)^2 = 4x^2 + \frac{4}{7}xy - \frac{3}{2}xz + \frac{4}{7}xy + \frac{4}{49}y^2 - \frac{3}{14}yz - \frac{3}{2}xz - \frac{3}{14}yz + \frac{9}{16}z^2$$

$$h\left(2x + \frac{2}{7}y - \frac{3}{4}z\right) = 4x^2 + \frac{4}{49}y^2 + \frac{9}{16}z^2 + \frac{8}{7}xy - \frac{6}{2}xz - \frac{6}{14}yz + 7$$

$$h\left(2x + \frac{2}{7}y - \frac{3}{4}z\right) = 4x^2 + \frac{4}{49}y^2 + \frac{9}{16}z^2 + 1\frac{1}{7}xy - 3xz - \frac{3}{7}yz + 7$$