099 §3.6 #s 1-45, 53

#s 1-12 $f(x) = 2x-5$, $g(x) = x^2+3x+4$ ⟶

(1) $f(2) = 2(2)-5 = 4-5 = \boxed{-1 = f(2)}$

(3) $f(-3) = 2(-3)-5 = -6-5 = \boxed{-11 = f(-3)}$

(5) $g(-1) = (-1)^2+3(-1)+4 = 1-3+4 = \boxed{2 = g(-1)}$

(7) $g(-3) = (-3)^2+3(-3)+4 = 9-9+4 = \boxed{4 = g(-3)}$

(9) $\boxed{g(a) = a^2+3a+4}$

(11) $f(a+6) = (a+6)^2+3(a+6)+4$ Main idea

Technical follow thru.

$= a^2+2(a)(6)+6^2+3a+(3)(6)+4$

$= a^2+12a+36+3a+18+4$

$= \boxed{a^2+15a+58 = f(a+6)}$

#s 13-24 $f(x) = 3x^2-4x+1$, $g(x) = 2x-1$ ⟶

(13) $\boxed{f(0) = 1}$

(15) $g(-4) = 2(-4)-1 = -8-1 = \boxed{-9 = g(-4)}$

099 §3.6 #s 17-45, 53

17 $f(-1) = 3(-1)^2 - 4(-1) + 1 = 3(1) + 4 + 1 = \boxed{8 = f(-1)}$

19 $g(\frac{1}{2}) = 3(\frac{1}{2})^2 - 4(\frac{1}{2}) + 1 = 3(\frac{1}{4}) - 2 + 1$

$= \frac{3}{4} - 1 = \frac{3}{4} - \frac{1}{1} \cdot \frac{4}{4} = \boxed{\frac{-1}{4} = g(\frac{1}{2})}$

21 $\boxed{f(a) = 3a^2 - 4a + 1}$

23 $f(a+2) = 3(a+2)^2 - 4(a+2) + 1$

$= 3(a^2 + 2(a)(2) + 2^2) - 4a - 8 + 1$

$= 3a^2 + 12a + 12 - 4a - 7$

$= \boxed{3a^2 + 8a + 5 = f(a+2)}$

#s 25-30 $f = \{(1,4), (-2,0), (3, \frac{1}{2}), (\pi, 0)\}$

$g = \{(1,1), (-2,2), (\frac{1}{2}, 0)\}$

25 $\boxed{f(1) = 4}$ 27 $\boxed{g(\frac{1}{2}) = 0}$ 29 $\boxed{g(-2) = 2}$

#s 31-38 $f(x) = x^2 - 2x$ & $g(x) = 5x - 4$ $\longrightarrow$

31 $f(-4) = (-4)^2 - 2(-4) = 16 + 8 = \boxed{24 = f(-4)}$

33 $f(-2) + g(-1) = (-2)^2 - 2(-2) + 5(-1) - 4$

$= 4 + 4 - 5 - 4 = \boxed{-1 = f(-2) + g(-1)}$

099 §3.6 #s 35–45, 53

38 $2f(x)-3g(x) = 2(x^2-2x) - 3(5x-4)$

$= 2x^2 - 4x - 15x + 12$

$= \boxed{2x^2 - 19x + 12 = 2f(x) - 3g(x)}$

37 $f[g(3)] = f(5(3)-4) = f(15-4) = f(11)$

$= 11^2 - 2(11) = 121 - 22 = 99 = f[g(3)]$

Our 1st encounter with a function feeding on the output of another function.

THIS IS FUNCTION COMPOSITION

#s 39–44 $f(x) = \frac{1}{x+3}$, $g(x) = \frac{1}{x} + 1$ ⟶

39 $f\left(\frac{1}{3}\right) = \frac{1}{\frac{1}{3}+3} = \frac{1}{\frac{1}{3}+\frac{3}{1}\cdot\frac{3}{3}} = \frac{1}{\frac{1+9}{3}} = \frac{1}{\frac{10}{3}}$

$= 1\left(\frac{3}{10}\right) = \frac{3}{10}$ Invert & Multiply, saith the Math Gods!

41 $f\left(-\frac{1}{2}\right) = \frac{1}{-\frac{1}{2}+3} = \frac{1}{-\frac{1}{2}+\frac{3}{1}\cdot\frac{2}{2}} = \frac{1}{\frac{-1+6}{2}}$

$= \frac{1}{\frac{5}{2}} = \boxed{\frac{2}{5} = f\left(-\frac{1}{2}\right)}$

099 §3.6 #s 43, 45, 53

43 $f(-3) = \frac{1}{-3+3} = \frac{1}{0}$ $\nexists$

$x = -3$ is not in the domain of f!

$x = -3 \notin \mathcal{D}(f)$

45 $f(x) = x^2 - 4 \Longrightarrow$

(a) $f(a) - 3 = a^2 - 4 - 3 = \boxed{a^2 - 7} = f(a) - 3$

(b) $f(a-3) = (a-3)^2 - 4 = a^2 - 2(a)(3) + 3^2 - 4$

$= \boxed{a^2 - 6a + 5 = f(a-3)}$

(c) $f(x) + 2 = x^2 - 4 + 2 = \boxed{x^2 - 2 = f(x) + 2}$

(d) $f(x+2) = (x+2)^2 - 4 = x^2 + 4x + 4 - 4 = \boxed{x^2 + 4x = f(x+2)}$

(e) $f(a+b) = (a+b)^2 - 4 \boxed{= a^2 + 2ab + b^2 - 4 = f(a+b)}$

(f) $\boxed{f(x+h) =}\ (x+h)^2 - 4 = \boxed{x^2 + 2xh + h^2 - 4}$

099 §3.6 #53

(53) Your 1st Exponential!

$V(t) = 150 \cdot 2^{t/3}$ is Value, in \$ of an art investment that doubles every 3 years.

See how it's twice as big every time another 3 years passes?

$V(0) = 150 \cdot 2^{\frac{0}{3}} = 150 \cdot 2^0 = \$150$ = purchase price

$V(3) = 150 \cdot 2^{\frac{3}{3}} = 150 \cdot 2^1 = \$300$ after 3 yrs.

$V(6) = 150 \cdot 2^{\frac{6}{3}} = 150 \cdot 2^2 = 150 \cdot 4 = \$600$

after 6 years.