RECALL HOW TO INPUT EXPRESSIONS INTO FUNCTIONS.

e.g. Let
$$f(x) = 2x^{2} + 5x - 7$$

THEN $f(x) = 2(3x - 1)^{2} + 5(3x - 1) - 7$
 $f(3x - 1) = 2(3x - 1)^{2} + 5(3x - 1) - 7$
 $= 2(9x^{2} - 6x + 1) + 15x - 5 - 7$
 $= 18x^{2} - 12x + 2 + 15x - 5 - 7$
 $= 18x^{2} + 3x - 10$

NOW, surpose g(x)=3x-1. Then f(g(x))=f(3x-1)=

THIS IS CALLED FUNCTION COMPOSITION,

"f of a of x", "f composed with a".



MonAlian: fog(x)

IDEA: GUTPUT OF a BECOMES INPUT OF f.

ex. IF f(-2)=5 AND 9(4) = -2, FIND f()(4)).

ex. let $f(x) = \frac{x+1}{x-1}$ & $g(x) = x^2 - 2$.

FIND (a) fog(3) (c) gof(3)

(e) 30 3(x) (f) f , g (x) (MARO!)

(p) f . (x)

(d) go f(x)

ex let $f(x) = \sqrt{x} + 1$ if $g(x) = 36x^2 - 100$

FIND (a) f. g(x) & ITS DONAIN

(b) gof(x) & HS DOMAND

(c) fof(x) & MS DOMAIN

(d) gog(x) & Ms DOMAIN

ADDITIONAL EXERCISES

47–58 ■ Composition of Functions Find the functions $f \circ g$, $g \circ f$, $f \circ f$, and $g \circ g$ and their domains.

47.
$$f(x) = 2x + 3$$
, $g(x) = 4x - 1$

48.
$$f(x) = 6x - 5$$
, $g(x) = \frac{x}{2}$

49.
$$f(x) = x^2$$
, $g(x) = x + 1$

50.
$$f(x) = x^3 + 2$$
, $g(x) = \sqrt[3]{x}$

51.
$$f(x) = \frac{1}{x}$$
, $g(x) = 2x + 4$

52.
$$f(x) = x^2$$
, $g(x) = \sqrt{x-3}$

53.
$$f(x) = |x|$$
, $g(x) = 2x + 3$

54.
$$f(x) = x - 4$$
, $g(x) = |x + 4|$

55.
$$f(x) = \frac{x}{x+1}$$
, $g(x) = 2x - 1$

56.
$$f(x) = \frac{1}{\sqrt{x}}$$
, $g(x) = x^2 - 4x$

57.
$$f(x) = \frac{x}{x+1}$$
, $g(x) = \frac{1}{x}$

58.
$$f(x) = \frac{2}{x}$$
, $g(x) = \frac{x}{x+2}$