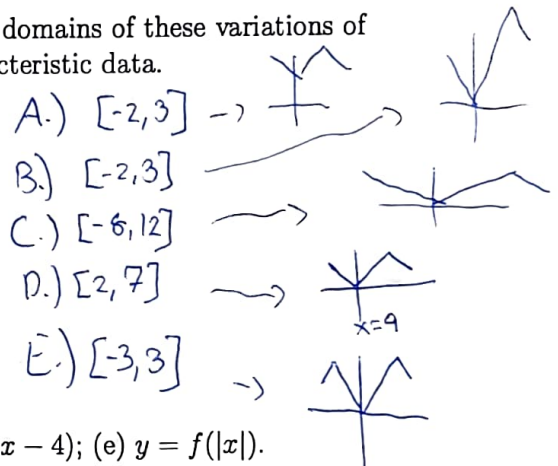
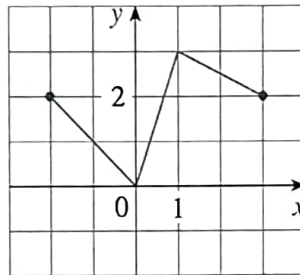


MATH 1A Worksheet (Jan 29th)

1. Complete the following table

x	1	2	3	4	5
$f(x)$	3	1	4	2	8
$g(x)$	1	3	5	3	2
$f \circ g(x)$	3	4	8	4	1

2. Suppose a function f has the following graph, identify the domains of these variations of f (from (a) to (e)) and draw their graphs with some characteristic data.



- (a) $y = f(x) + 3$; (b) $y = 4f(x)$; (c) $y = f(\frac{1}{4}x)$; (d) $y = f(x - 4)$; (e) $y = f(|x|)$.

3. Given the following pairs of functions f, g , identify their composite function $f \circ g$ and an appropriate domain.

- (a) $f(x) = x + 1, g(x) = x - 1$; $f(g(x)) = x, \mathbb{R}$
- (b) $f(x) = \sqrt{x}, g(x) = x^2$; $f(g(x)) = |x|, \mathbb{R}$
- (c) $f(x) = x^2, g(x) = \sqrt{x}$; $f(g(x)) = x, [0, \infty)$
- (d) $f(x) = \frac{1}{x}, g(x) = \tan x$; $f(g(x)) = \cot(x), \mathbb{R} \setminus \{k \cdot \pi \mid k \in \mathbb{Z}\}$

4. Given $f(x) = x^2$.

- (a) Does there exist function g such that $g \circ f(x) = x$? If so, give an example; if not, explain why. *No - Range $f(x) = f(-x)$, so $g(f(x)) = g(f(-x))$ can be only one of $x, -x$ for $x \neq 0$*
- (b) Does there exist function g such that $f \circ g(x) = x$ (over the domain of g)? If so, give an example; if not, explain why. *Yes $g(x) = \sqrt{x}$*
- (c) Answer these two questions when the domain of f becomes $[0, +\infty) = \{x : x \geq 0\}$. *Yes, yes.*

5. A spherical balloon is being inflated and the radius of the balloon is increasing at a rate of 3cm/s while the initial radius (that is, at $t = 0$) of this balloon is 2cm .

- (a) Express the radius r as a function of time t . $r = 2 + 3t$
- (b) If $V(r) = \frac{4\pi}{3}r^3$ is the volume of a sphere of radius r , then find $V \circ r$ and interpret it. $\frac{4\pi}{3}(2+3t)^3$
→ Polynomial in time

6. Given two functions f, g

- (a) If g is even, can one tell the parity of $f \circ g$ or $g \circ f$? Explain why or why not. *No } Left/right*
- (b) If g is odd, can one tell the parity of $f \circ g$ or $g \circ f$? Explain why or why not. *No } Shift on x*
- (c) In addition to assumption in (b), what if f is even or odd? Answer the same question.

Odd \circ Odd = odd
 Odd \circ Even = Even
 Even \circ Odd = Even
 Even \circ Even = Even