

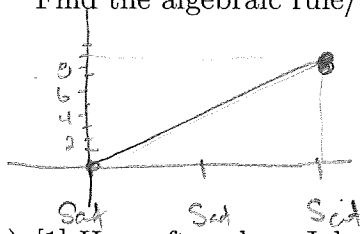
Key

## Quiz 2

Show *all* your work. Reasonable supporting work must be shown to earn credit. There are *two* sides to this quiz.

1. (§1.2 #109) John noticed that it is springtime and that the hedge by his window has been growing. On Saturday he trimmed it even with his window and recorded that the hedge grew 9 inches in two weeks.

- (a) [1] Let  $f(x)$  be the height of the hedge above the window  $x$  days after Saturday. Find the algebraic rule/expression for  $f(x)$ .



(assuming a line is a yard approx for two)

$$f(x) = \frac{9}{14} x$$

- (b) [1] How often does John need to trim his hedge to be sure that it doesn't grow more than 5 inches between trimmings? Show your work!

need to find  $x$  so  $f(x) = 5$

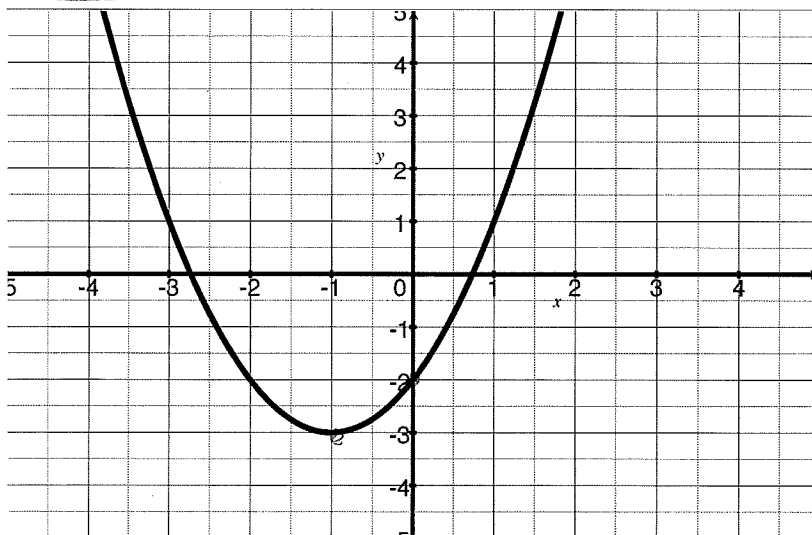
$$5 = \frac{9}{14} x$$

$$\Rightarrow \frac{14}{9} \cdot 5 = x$$

$$\Rightarrow \frac{70}{9} = x \approx 7.78 \text{ days}$$

so need to trim every 7 days or so.

2. [3] (Lecture 10/3) Consider the graph of  $z$  below which is a parabola that has been shifted vertically and horizontally. Find the algebraic rule/expression of  $z$ .



+1.5 down 3  $\Rightarrow$   $\square - 3$   
 +1.5 Left 1  $\Rightarrow$   $\square + 1$

Let  $d(x) = x^2$   
 then down 3  $\Rightarrow d(x) - 3$   
 or  $x^2 - 3$

Left 1  $\Rightarrow d(x+1) - 3$   
 or  $(x+1)^2 - 3$

put it +1.5

3. Let  $g$  be the piecewise defined graph shown below.

(a) [1] (WebHW3 #1) Find  $(g + g)(3)$

$$\begin{aligned} (g+g)(3) &= g(3) + g(3) \quad (+.5) \\ &= -1 + -1 \quad (+.5) \\ &= -2 \end{aligned}$$

(b) [1] (WebHW3 #3) Find  $(g \circ g)(3)$

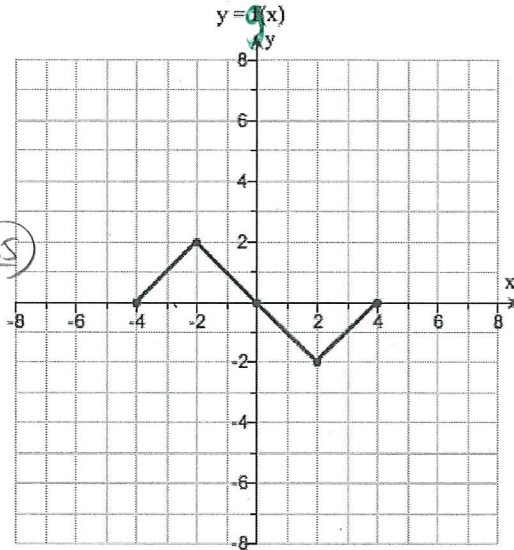
$$\begin{aligned} (g \circ g)(3) &= g(g(3)) \quad \text{comp } (+.5) \\ &= g(-1) \\ &= 1 \quad (+.5) \end{aligned}$$

(c) [1] (Transformation Activity #5b)

What is the range of  $g$ ?

$y$  values  $(+.5)$

$$[-2, 2] \quad \text{got it } (+.5)$$



(d) [2] (WebHW2 #10 & §1.5 #116) Given that  $g$  is comprised of three lines, find the piece-wise defined algebraic rule/expression of  $g$  in the form below.

lines  $(+.5)$

$$g(x) = \begin{cases} x+4 & (+.5) \\ -x & (+.5) \\ x-4 & (+.5) \end{cases}$$

line  $y = mx + b$   
 slope =  $\frac{\text{rise}}{\text{run}} = \frac{1}{1}$   
 thru  $(-2, 2)$  so  
 if  $-4 \leq x < -2$   
 if  $-2 \leq x \leq 2$   
 if  $2 \leq x \leq 4$

line  $y = mx + b$   
 slope =  $\frac{\text{rise}}{\text{run}} = \frac{1}{1}$   
 thru  $(4, 0)$  so  
 $0 = (1)(4) + b$   
 $\Rightarrow b = -4$   
 So  
 $y = x - 4$

So  
 $y = x + 4$

middle line:  $y = mx + b$

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{-1}{1} = -1$$

$y$  intercept of 0

$$\Rightarrow y = -x + 0$$