

121 Practice Test 2

$$f = \{(1, -1), (2, 4), (3, 2), (4, 3)\}$$

(a) Yes, func.

(c) ~~+~~

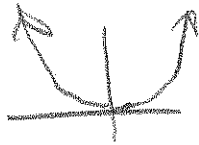
(b) ~~+~~

(e)  $D = \{1, 2, 3, 4\}$

(f) Yes, 1-to-1

(f)  $R = \{-1, 4, 2, 3\}$

(2)



(a) func. Yes

(a) func. Yes

(a) func. No

(b) 1-to-1. Yes

(b) 1-to-1. No

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(c)  $D = (-\infty, \infty)$

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(d)  $R = (-\infty, \infty)$

(d)  $R = [0, \infty)$

(d)  $R = [3, \infty) \cup (-\infty, -3]$   
(Approximately)

(3)

$$f(x) = x^2 - 7 \Rightarrow \frac{f(x+h) - f(x)}{h} =$$

$$\frac{(x+h)^2 - 7 - (x^2 - 7)}{h} = \frac{x^2 + 2xh + h^2 - 7 - x^2 + 7}{h}$$

$$= \frac{2xh + h^2}{h} = \frac{h(2x + h)}{h} = \boxed{2x + h}$$

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4)  $\sqrt[3]{y} + x = 7$

$$7^3 + 3(7)^2(-x) + 3(7)(-x)^2 + (-x)^3$$

5pts  $\sqrt[3]{y} = 7 - x$

$$343 - 147x + 21x^2 - x^3$$

$$= -x^3 + 21x^2 - 147x + 343$$

$y = (7-x)^3$  is a function.

5)  $f(x) = \frac{x+2}{x-11}$ ,  $g(x) = \sqrt{x+8}$

5pts (a)  $D(f) = \{x \mid x \neq 11\} = (-\infty, 11) \cup (11, \infty) = \mathbb{R} \setminus \{11\}$   
(A good)

(b)  $D(g) = \{x \mid x+8 \geq 0\} = \{x \mid x \geq -8\} = [-8, \infty)$

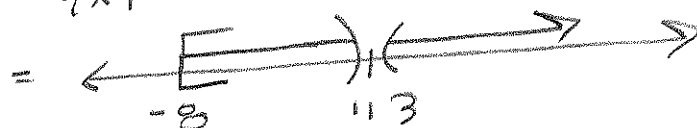
(c)  $(f \circ g)(x) = \frac{\sqrt{x+8} + 2}{\sqrt{x+8} - 11}$

$\sqrt{x+8} = 11$

$x+8 = 121$

$x = 113$

(d)  $D(f \circ g) = \{x \mid x \in D(g) \text{ and } g(x) \in D(f)\}$   
 $= \{x \mid x \geq -8 \text{ and } \sqrt{x+8} \neq 11\}$   
 $= \{x \mid x \geq -8 \text{ and } x \neq 113\}$



$= [-8, 113) \cup (113, \infty)$

(e)  $(f+g)(x) = \frac{x+2}{x-6} + \sqrt{x+8}$

$D = D(f) \cap D(g) = [-8, 6) \cup (6, \infty)$

(f)  $\left(\frac{f}{g}\right)(x) = \frac{\frac{x+2}{x-6}}{\sqrt{x+8}} = \frac{x+2}{(x-6)\sqrt{x+8}}$

$D = (-8, 6) \cup (6, \infty)$

$= D(f) \cap D(g) \cap \{x \mid g(x) \neq 0\}$

$x = -8$  disallowed

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6 (a)  $f(x) = \frac{x+5}{x-11}$  is 1-to-1

PF  $\frac{x_1+5}{x_1-11} = \frac{x_2+5}{x_2-11}$

$(x_1+5)(x_2-11) = (x_2+5)(x_1-11)$

$x_1x_2 - 11x_1 + 5x_2 - 55 = x_2x_2 - 11x_2 + 5x_1 - 55$

$-11x_1 + 5x_2 = -11x_2 + 5x_1$

$-16x_1 = -16x_2$

$x_1 = x_2$   $\square$

6 (b) Find  $f^{-1}$ :

$\frac{y+5}{y-11} = x$

$y+5 = x(y-11)$

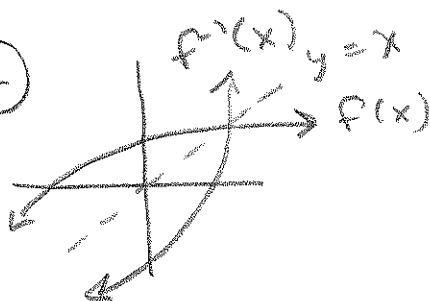
$y+5 = xy - 11x$

$y - xy = -5 - 11x$

$y(1-x) = -5 - 11x$

$y = \frac{-5-11x}{1-x} = \frac{11x+5}{x-1}$

7



8  $y$  varies jointly as  $x$  &  $w$  and inversely as cube of  $r$ .

$y = k \frac{xw}{r^3}$

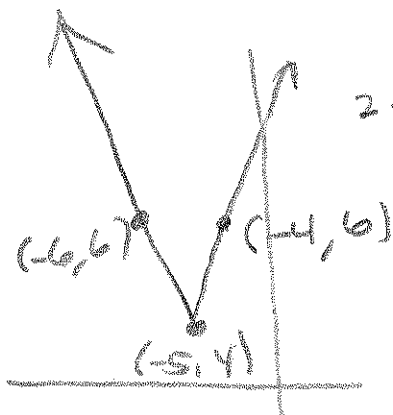
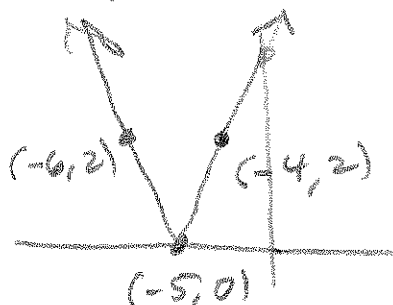
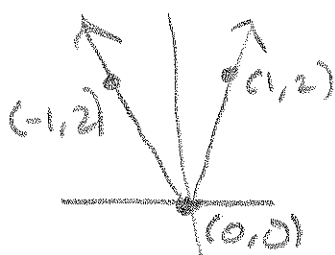
Not enough info to solve further.

9  $g(x) = 2|x+5| + 4$

$f(x) = |x|$

$2f(x) = 2|x|$

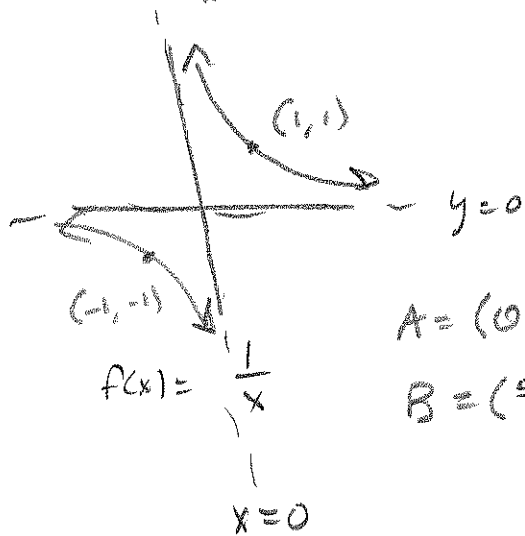
$2f(x+5) = 2|x+5|$



$2f(x+5) + 4 = 2|x+5| + 4 = g(x)$

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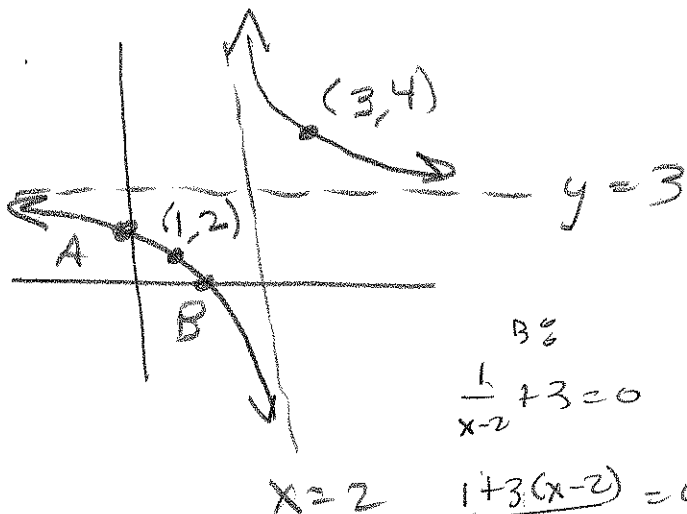
$$h(x) = \frac{1}{x-2} + 3$$



$$A = (0, \frac{5}{3})$$

$$B = (\frac{5}{3}, 0)$$

$$f(x-2) + 3$$



$$B: \frac{1}{x-2} + 3 = 0$$

$$\frac{1+3(x-2)}{x-2} = 0$$

$$\frac{1+3x-6}{x-2} = 0$$

$$3x-5=0$$

$$3x=5$$

$$x = \frac{5}{3}$$

(10) (a)  $|2x-3|-1 > 5$

$$|2x-3| > 6$$

$$2x-3 > 6 \text{ OR } 2x-3 < -6$$

$$2x > 9 \text{ OR } 2x < -3$$

$$\left\{ x \left( x > \frac{9}{2} \text{ OR } x < -\frac{3}{2} \right) \right\}$$

$$= (-\infty, -\frac{3}{2}) \cup (\frac{9}{2}, \infty)$$

(b)  $|2x-3|-1 \leq -5$

$$|2x-3| \leq -4$$

No Sol'n