

**MATH 30 - Precalculus. Homework 12. Not to hand in.** Professor Luis Fernández

NAME: \_\_\_\_\_

**DO NOT** write your answers here. Do it in other sheets and **show all your work**.

**STAPLE this sheet to your other sheets.**

1. Recall that to show that a function  $g$  is the inverse of a function  $f$  one needs to show that  $f(g(x)) = x$  and that  $g(f(x)) = x$ . To do this,

1. Find  $f(g(x))$  and simplify and see that you get  $x$ .
2. Find  $g(f(x))$  and simplify and see that you get  $x$ .

For the following, show that  $g$  is the inverse of  $f$ .

a)  $f(x) = 4x - 7$  and  $g(x) = \frac{x+7}{4}$ .

b)  $f(x) = \frac{2}{x-5}$  and  $g(x) = \frac{2}{x} + 5$ .

c)  $f(x) = -3x + 1$  and  $g(x) = \frac{x-1}{-3}$ .

d)  $f(x) = \frac{x-2}{2x+1}$  and  $g(x) = \frac{-x-2}{2x-1} + 5$ .

2. Find the inverse of the following functions.

a)  $f(x) = 2x - 1$

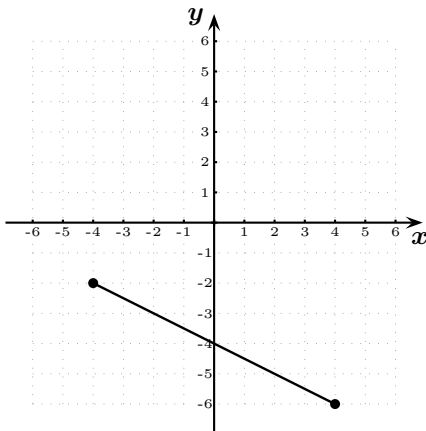
b)  $g(x) = \frac{1}{x} + 1$

c)  $h(x) = x^2 - 4$ , with domain  $(-\infty, 0]$  (so  $x \leq 0$ )

d)  $i(x) = \frac{x-1}{x+1}$ .

3. Let  $f$  be the function described by the following graph:

Graph of  $f$



a) Fill in the blanks (using interval notation):

The domain of  $f$  is .....

The range of  $f$  is .....

The domain of  $f^{-1}$  is .....

The range of  $f^{-1}$  is .....

We can see that the domain of  $f$  is the same as the ..... of  $f^{-1}$ ,  
and the range of  $f$  is the same as the domain of .....

b) Evaluate the following:

$f^{-1}(-3) = \dots\dots\dots$

$f^{-1}(-4) = \dots\dots\dots$

$f^{-1}(-6) = \dots\dots\dots$

4. Solve the following equations.

a)  $|x - 3| = 4$ .

b)  $|x + 2| = 5$ .

c)  $|2x + 3| = 9$ .

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5. Solve the following inequalities.

a)  $|x - 3| \leq 4$ .

b)  $|x + 2| \geq 5$ .

c)  $|2x + 3| > 9$ .

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6. Find the following values of inverse trigonometric functions.

a)  $\sin^{-1}\left(\frac{\sqrt{2}}{2}\right) =$

b)  $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right) =$

c)  $\sin^{-1}\left(-\frac{\sqrt{1}}{2}\right) =$

d)  $\sin^{-1}(-1) =$

e)  $\sin^{-1}(1) =$

f)  $\cos^{-1}\left(-\frac{\sqrt{1}}{2}\right) =$