Honors Math 3
Unit 4 – Practice Test

Name: Answers

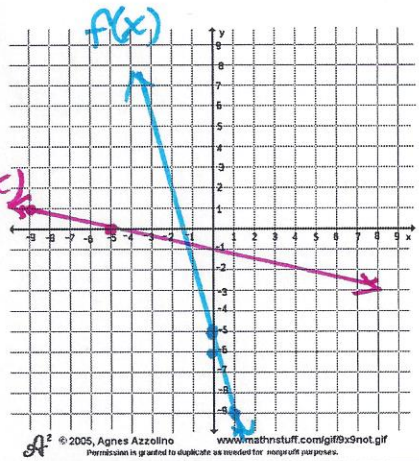
1. Find the inverse of **f(x) = -4x – 5**. Graph and label both the function and its inverse.

$x = -4y - 5$

$x + 5 = -4y$

$\frac{x+5}{-4} = y$

$f^{-1}(x) = \frac{x+5}{-4}$ or $\frac{-x-5}{4}$



2. Find the inverse of $f(x) = \frac{x+7}{5}$.
State the domain and range of both the function and its inverse.

f(x): domain $(-\infty, \infty)$
range $(-\infty, \infty)$

$x = \frac{y+7}{5} \Rightarrow 5x = y + 7$

$f^{-1}(x) = 5x - 7$

$f^{-1}(x)$: domain $(-\infty, \infty)$
range $(-\infty, \infty)$

3. Given **f(x) = 7x – 12**, find $f^{-1}(8)$.

$8 = 7x - 12$

$20 = 7x$

$\frac{20}{7} = x$

$f^{-1}(8) = \frac{20}{7}$

4. Camryn sells computers. She earns commission for her computer sales plus a fixed wage for each day she works. Her daily earnings, in dollars, can be estimated using the function **f(x) = 0.25x + 45**, where x represents her computer sales in dollars.

a) State a reasonable domain for the problem.

$x \geq 0$ or $[0, \infty)$ ← You could have a # here

b) Find the inverse of f(x).

$f^{-1}(x) = 4x - 180$

c) Identify the independent and dependent quantities of the inverse.

x = daily earnings – indep

$f^{-1}(x)$ = computer sales – dep.

5. Function A contains the points {(-10, 3), (-9, 5), (-8, 7), (-7, 5)}. List the set of points for the inverse of Function A.

$A^{-1} = \{(3, -10), (5, -9), (7, -8), (5, -7)\}$

6. Find the inverse of $f(x) = \frac{3x-1}{x+7}$.

$x = \frac{3y-1}{y+7}$

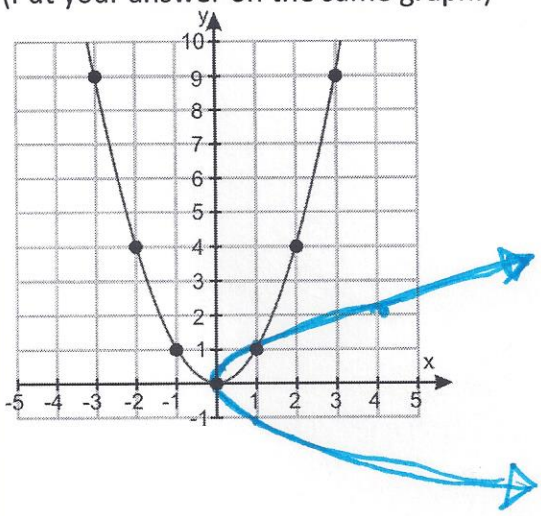
$xy + 7x = 3y - 1$

$xy - 3y = -7x - 1$

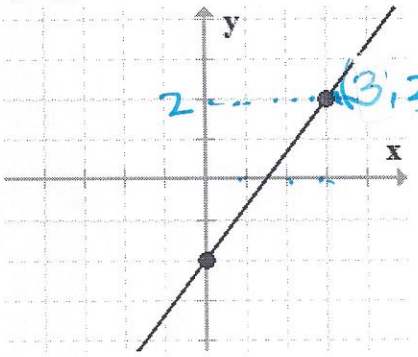
$y(x - 3) = -7x - 1$

$f^{-1}(x) = \frac{-7x-1}{x-3} = \frac{7x+1}{3-x}$

7. Graph the inverse of the relation below. (Put your answer on the same graph.)



8. Using the graph below, find $f^{-1}(x)$ when $x = 2$.



$f^{-1}(2) = 3$

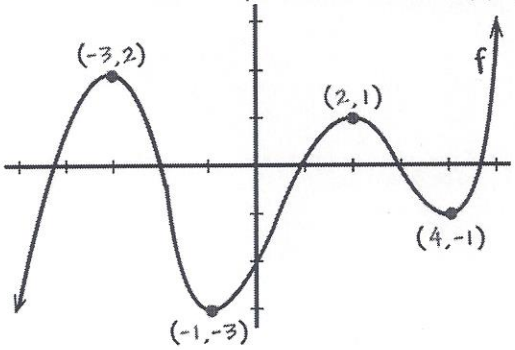
$f^{-1}(2) = ?$

$f(?) = 2$

$f(3) = 2$

So $f^{-1}(2) = 3$

9. For which of the following domains would the graph below have an inverse that is a function? (Choose all that apply.)



$-3 \le x \le -1$

$-2 \le x \le 0$

$1 \le x \le 3$

$2 \le x \le 4$

10. Using the chart below, find f(4) and $f^{-1}(-3)$.

x	f(x)
0	-8
1	-7
2	-6
3	-5
4	-4
5	-3

$f(4) = -4$

$f^{-1}(-3) = 5$

11. Find the inverse of the relation

$$f(x) = \frac{\sqrt{4x-1}}{5}$$

$x = \frac{\sqrt{4y-1}}{5}$

$5x = \sqrt{4y-1}$

$(5x)^2 = 4y - 1$

$25x^2 + 1 = 4y$

$f^{-1}(x) = \frac{25x^2+1}{4}$

12. Find the inverse of the relation

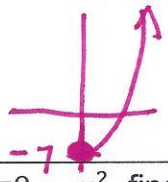
$$f(x) = 5x^7 - 12$$

$x = 5y^7 - 12$

$x + 12 = 5y^7$

$\frac{x+12}{5} = y^7$

$f^{-1}(x) = \sqrt[7]{\frac{x+12}{5}}$



f(x): domain $[0, \infty)$ ← one-to-one part so $f^{-1}(x)$ is a function
range $[-7, \infty)$

13. If $f(x) = \frac{x}{x+1}$ and $g(x) = 9 - x^2$, find f(g(4)) and g(f(2)).

$g(4) = 9 - 4^2 = -7$

$f(-7) = \frac{-7}{-7+1} = \frac{-7}{-6} = \boxed{\frac{7}{6}}$

$f(2) = \frac{2}{3}$

$g\left(\frac{2}{3}\right) = 9 - \left(\frac{2}{3}\right)^2 = 9 - \frac{4}{9}$

$= \boxed{\frac{77}{9}}$

14. Find the Inverse FUNCTION of $f(x) = 5x^2 - 7$ and state the domain of the inverse.

$x = 5y^2 - 7$

$x + 7 = 5y^2$

$\frac{x+7}{5} = y^2$

$\boxed{y = f^{-1}(x) = \sqrt{\frac{x+7}{5}}}$

$f^{-1}(x)$: domain $[7, \infty)$ range $[0, \infty)$

15. A function is shown below.

$$\begin{cases} -x^2 + 2x, & x \le -3 \\ 2\left(\frac{1}{3}\right)^{2x}, & -3 < x < 4 \\ \frac{2x-5}{x-7}, & x \ge 4 \end{cases}$$

What is the value of the expression **f(-4) + 3f(-1) – f(5)?**

$-24 + 30.9 + 2.5$

5.5

16. If f(x) = cosx and g(x) = |5x + 7| , find (g∘f)(x) and (f∘g)(x).

$g(f(x)) = g(\cos x)$

$= |5(\cos x) + 7| = |5\cos x + 7|$

$f(g(x)) = f(|5x+7|)$

$= \cos|5x+7| = \cos|5x+7|$

17. Write two functions f(x) and g(x) such that h(x) = f(g(x)).

h(x) = $\frac{1}{x^3 - 7x}$

$g(x) = x^3 - 7x$

$f(x) = \frac{1}{x}$

18. Write two functions f(x) and g(x) such that h(x) = f(g(x)).

h(x) = 5(x + 1)² – 7(x + 1) + 1

$g(x) = (x+1)$

$f(x) = 5x^2 - 7x + 1$

19. Determine if **f(x) = 4x + 1** and **g(x) = 0.25x – 0.25** are inverse functions.

$f(g(x)) = f(0.25x - 0.25)$

$= 4(0.25x - 0.25) + 1$

$= x - 1 + 1 = x$ ✓

$g(f(x)) = g(4x+1) =$

$0.25(4x+1) - 0.25 =$

$x + 0.25 - 0.25 = x$ ✓

Inverses because $f(g(x)) = x$ and $g(f(x)) = x$.

20. If a = -3, b = 6, and c = 4, evaluate:

a) **|3a – 4b| - |-2c|**

$|3(-3) - 4(6)| - |-2(4)| = |-19| - |-8| = \boxed{11}$

b) **|b – a| + |5a| - |c – 3|**

$|6 - -3| + |5 \cdot -3| - |4 - 3|$

$9 + 15 - 1 = \boxed{13}$

21. Solve.

$5|2x + 7| - 15 = 5$

$5|2x+7| = 20$

$|2x+7| = 4$

$2x+7 = 4$ or $2x+7 = -4$

$x = -1.5$ $\quad$ $x = -5.5$

22. Solve.

$3|x - 5| + 12 = 2$

$|x-5| = -\frac{10}{3}$

no solution

23. Solve and check.

$|8 + r| - 3 = 2r$

$|8+r| = 2r+3$

$8+r = 2r+3$ or $8+r = -2r-3$

$-r = -5$ $\quad$ $3r = -11$

$r = 5$ $\quad$ ~~$r = -11/3$~~

24. A machine is used to fill each of several bags with 20 ounces of sugar. After the bags are filled, another machine weighs them. If the bag weighs 0.4 ounces more or less than the desired weight, the bag is rejected. Write an equation to find the heaviest and lightest bag the machine will approve.

$|x-20| < 0.4$

25. Solve and graph on a number line.

$|3x + 2| < -5$

no solution

26. Solve and graph on a number line.

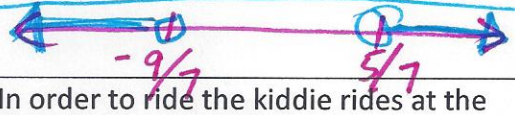
$|7x + 2| - 3 > 4$

$|7x+2| > 7$

$7x+2 > 7$ or $7x+2 < -7$

$7x > 5$ $\quad$ $7x < -9$

$x > \frac{5}{7}$ or $x < -\frac{9}{7}$



27. Solve and graph on a number line.

$2|x + 3| \leq 6$ $\quad$ $|x+3| \leq 3$

$x+3 \leq 3$ and $x+3 \geq -3$

$x \leq 0$ and $x \geq -6$

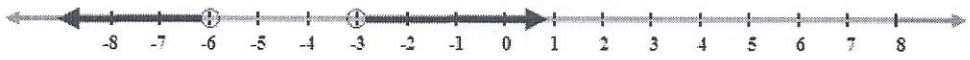
$-6 \leq x \leq 0$

28. In order to ride the kiddie rides at the amusement park, a child must weigh at least 30 pounds and no more than 85 pounds. Write an absolute value inequality to describe the situation.

$|x - 57.5| \leq 27.5$

29. Write an absolute value inequality for the graph below.

$|x + 4.5| < 1.5$



30. $y = x^2 - 16x + 9$

$x = y^2 - 16y + 9$

$x - 9 + 64 = y^2 - 16y + 64$

$x + 55 = (y-8)^2$

$\sqrt{x+55} = y - 8$

$f^{-1}(x) = \sqrt{x+55} + 8$