Algebra 2 Honors
Final Exam Review

Name Key 2017-18
Date JUNE Block B1, 4A

Know your parent functions! Be able to recognize the graph of each of the functions we've studied this year and be able to identify the domain and range of each function.

Chapter 4

1. Express $\log_4 18-\left(\frac{1}{2}\log_4 36+2\log_4 3\right)$ as a single logarithm. $\log_4\left(\frac{18}{36^{1/2}3^2}\right)=\log_4\frac{18}{(6\cdot 9)}=\log_4\frac{1}{3}$

In 2 - 4, solve each equation *algebraically*.

2. $16^{3x}=8^{x+6}$ $x=2$

$(2^4)^{3x}=(2^3)^{x+6}$

$12x=3x+18$

$9x=18$

3. $-4\log_6(9x)-7=-23$

$-4\log_6 9x=-16$

$\log_6 9x=4$

$6^4=9x$ $x=144$

4. $\log x-\log 8=3$

$\log\frac{x}{8}=3$

$10^3=\frac{x}{8}$ $x=8000$

5. Use the natural decay function, $N(t)=N_0e^{-kt}$, to find the decay constant for a substance that has a half-life of 1000 years.

$\frac{1}{2}=e^{-k(1000)}$

$\ln\frac{1}{2}=-1000k$

$k=\frac{\ln 1/2}{-1000}=0.000693$

6. Given the set of transformations on f, $f(x)=\log_4 x$, write the equation that yields g.

a. 3 units left, 2 units up $g(x)=$ $\log_4(x+3)+2$

b. 4 units right, reflection in the x-axis $g(x)=$ $-\log_4(x-4)$

c. reflection in the y-axis, down 3 $g(x)=$ $\log_4(-x)-3$

Chapter 5

In 7 - 9, simplify each expression. Assume all variables are positive.

7. $\frac{\sqrt{xy^3z^5}}{\sqrt[4]{x^5y^3z}}=\frac{x^{1/2}y^{3/2}z^{5/2}}{x^{5/4}y^{3/4}z^{1/4}}$

$=\frac{y^{3/4}z^{9/4}}{x^{3/4}}\cdot\frac{x^{1/4}}{x^{1/4}}$

$\boxed{\frac{x^{1/4}y^{3/4}z^{9/4}}{x}}$

8. $\left(\sqrt[3]{-8x^9}\right)^2$

$(-2x^3)^2=4x^6$

9. $(3x)^{2/3}(3x)^{7/3}$

$(3x)^{9/3}=(3x)^3$

$=27x^3$

In 10 - 12, solve each equation.

10. $\sqrt[3]{4x+1}-5=0$ $\qquad 4x+1=125$

$\left(\sqrt[3]{4x+1}\right)^3-(5)^3 \qquad 4x=124 \qquad x=31$

11. $\left[(10x-25)^{1/2}\right]^2=x^2 \qquad 10x-25=x^2$

$x^2-10x+25=0 \qquad (x-5)^2=0 \qquad x=5$

12. $\left(\sqrt{x+2}\right)^2=\left(1+\sqrt{x-3}\right)^2 \qquad x+2=1+2\sqrt{x-3}+x-3 \qquad (2)^2=\left(\sqrt{x-3}\right)^2$

$4=2\sqrt{x-3} \longrightarrow 4=x-3 \qquad x=7$

D: $[0,\infty)$ R. $[0,\infty)$

Using the graph of $f(x)=\sqrt{x}$ as a guide, describe the transformations. Then, state the domain and range.

13. $g(x)=-4\sqrt{x}+1$

reflection in x-axis, vertical stretch by 4, up 1

D: $[0,\infty)$ R: $(-\infty,1]$

14. $f(x)=3\sqrt{-x}+2$

reflection in y-axis, vertical stretch by 3, up 2

D: $(-\infty,0]$ R: $[2,\infty)$

In 15 - 17, identify the zeros, asymptotes, holes, and any points of discontinuity for each function. Then graph.

15. $f(x)=\dfrac{2x^2-18}{x^2-25} = \dfrac{2(x+3)(x-3)}{(x+5)(x-5)}$

Zeros. $x=\{-3,3\}$

asymptotes. VA: $x=5, x=-5$

HA: $y=2$

No holes

points of discontinuity: $x=-5,5$

16. $f(x)=\dfrac{x^2+2x-3}{x+3} = \dfrac{\cancel{(x+3)}(x-1)}{\cancel{(x+3)}}$

Hole: $(-3,-4)$

Zeros: $x=\{1\}$

asymptotes: none

P.O.D $x=-3$

17. $f(x)=\dfrac{x^3-2x^2-3x}{4x^2+8x} = \dfrac{\cancel{x}(x-3)(x+1)}{4\cancel{x}(x+2)}$

Hole $(0,-3/8)$

zeros: $x=\{3,-1\}$

asymptotes: HA: none

VA: $x=-2$

P.O.D $x=0, x=-2$

Solve each inequality.

18. $\frac{t-3}{t+6} > 0$

Solutions to equation: $t=3$

$\frac{t-3}{t+6}=0$

$+ \quad x \quad +$

$-6 \quad 3$

Exclusions from domain: $t \neq -6$

$(-\infty,-6) \cup (3,\infty)$

19. $\frac{x}{x+2} \geq -1$

Solutions to equation

$\frac{x}{x+2} = -1$

$x = -x-2$

$2x = -2$

$x = -1$

$-2 \quad -1$

$\boxed{(-\infty,-2) \cup [-1,\infty)}$

Exclusions: $x \neq -2$

20. Norton can mow a large lawn in about 4.0 hours. When Norton and Jessie work together, they can mow the same lawn in about 2.5 hours. How long would it take Jessie to mow the lawn by herself?

J: # of hours it would take Jesse to mow lawn herself

$\frac{1}{4}(2.5) + \frac{1}{J}(2.5) = 1$

$0.625 + \frac{2.5}{J} = 1$

$\frac{2.5}{J} = 0.375$

$\boxed{J = 6\frac{2}{3} \text{ hours}}$

21. Jessie can weed a garden in about 30 minutes. When Norton helps her, they can weed the same garden in about 20 minutes. How long would it take Norton to weed the garden by himself?

N: # of minutes it would take Norton to weed garden alone

$\frac{1}{30}(20) + \frac{1}{N}(20) = 1$

$\frac{2}{3} + \frac{20}{N} = 1$

$\frac{20}{N} = \frac{1}{3}$

N = 60 minutes

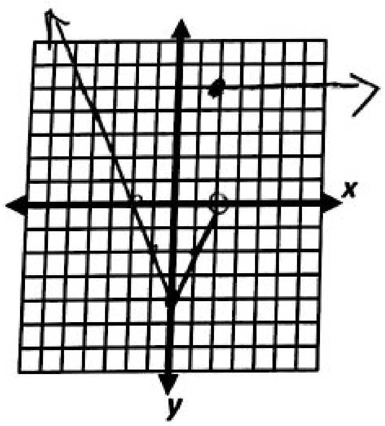
Chapter 6

Graph each function. State the domain and range.

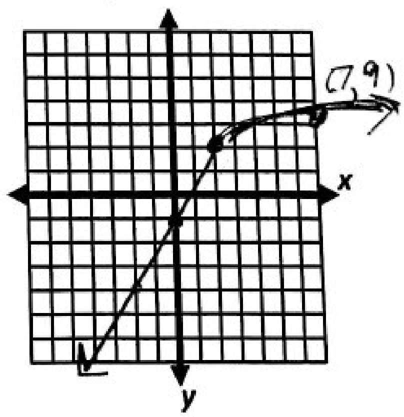
22. $f(x)=\begin{cases} 2|x|-4, & x<2 \\ 5, & x \geq 2 \end{cases}$

D: $(-\infty,\infty)$

R: $[-4,\infty)$



23. $g(x)=\begin{cases} \frac{3}{2}x-1, & x \leq 2 \\ \sqrt{x+2}, & x>2 \end{cases}$



D: $(-\infty,\infty)$

R: $(-\infty,\infty)$

$3(x-7)+2 = 3x-21+2$

24. Given $f(x)=\begin{cases}3x+2, x\le 0\\ x^2 \quad ,x>0\end{cases}$, write the rule for g(x), a horizontal translation of f(x) 7 units right.

$g(x) = f(x-7)$ $\quad g(x)=\begin{cases}3x-19, & x\le 7\\ (x-7)^2, & x>7\end{cases}$

25. Given $f(x)=\begin{cases}3x+2, x\le 4\\ x^2 \quad ,x>4\end{cases}$, write the rule for g(x), a horizontal stretch by 7 of f(x).

$g(x) = f(\frac{1}{7}x)$

$g(x)=\begin{cases}\frac{3}{7}x+2, & x\le 28\\ \frac{1}{49}x^2, & x>28\end{cases}$

In 26 - 29, given $f(x) = x^2 - 5x - 14$ and $g(x) = x^2 - 7$, find each function.

26. $(f+g)(x)$ $= 2x^2-5x-21$

27. $(g-f)(x)$ $= 5x+7$

28. $[f\circ g](x)$ $= x^4-19x^2+70$

$(x^2-7)^2-5(x^2-7)-14$

$x^4-14x^2+49-5x^2+35-14$

29. $g^{-1}(x)$ =

$x=y^2-7$

$x+7=y^2$

$y=\pm\sqrt{x+7}$

Find the inverse of each function. Determine whether the inverse is a function, and state its domain and range.

30. $f(x) = 5 - 8x$

$x=5-8y$

$\frac{x-5}{-8}=y$

$f^{-1}(x)=\frac{-x+5}{8}$

Function

D: $(-\infty,\infty)$

R: $(-\infty,\infty)$

31. $f(x) = \left(\frac{1}{3}x + 2\right)^2$

$\pm\sqrt{x}=\sqrt{(\frac{1}{3}y+2)^2}$

$\pm\sqrt{x}=\frac{1}{3}y+2$

$\pm\sqrt{x}-2=\frac{1}{3}y$

$y=\pm 3\sqrt{x}-6$

Not a function

D: $[0,\infty)$

R: $(-\infty,\infty)$

32. $f(x) = \frac{5}{2x+8}$

$x=\frac{5}{2y+8}$

$\frac{5}{x}=2y+8$

$\frac{\frac{5}{x}-8=2y}{2}$

$\boxed{\frac{5}{2x}-4=y}$

$\boxed{f^{-1}(x)=\frac{5}{2x}-4}$

Function

D: $x\ne 0$

R: $y\ne -4$

33. $f(x) = 3 + \sqrt{x-5}$

$x=3+\sqrt{y-5}$

$(x-3)^2=y-5$

$y=(x-3)^2+5,\ x\ge 3$

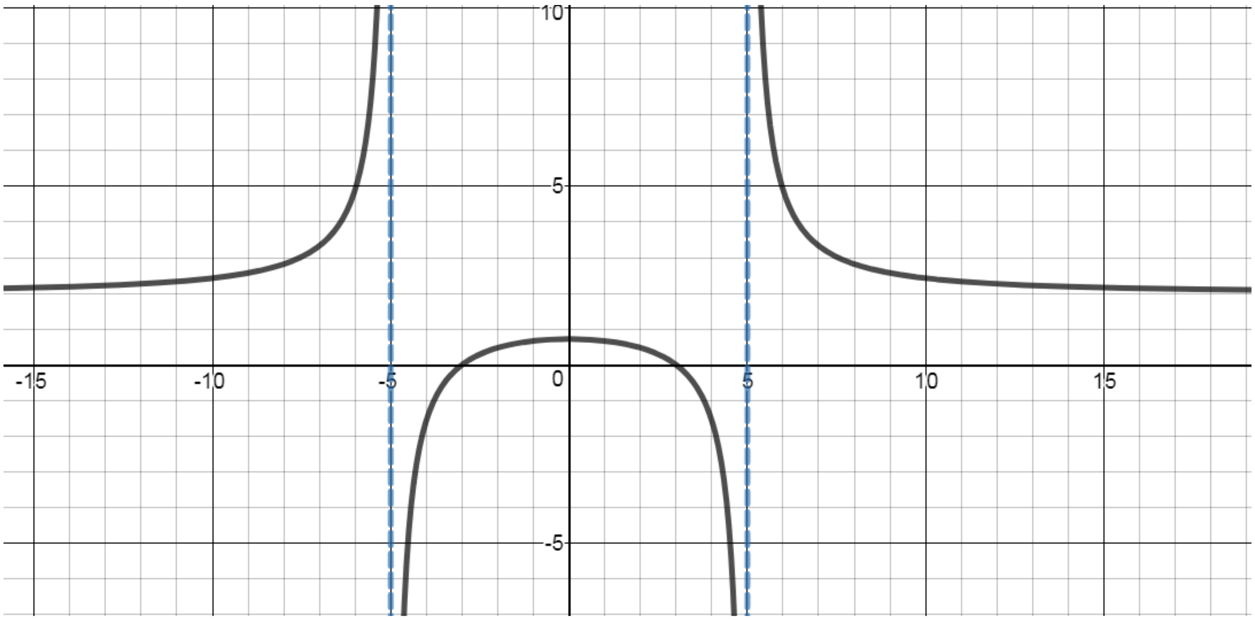
$f^{-1}(x)=(x-3)^2+5,\ x\ge 3$

Function

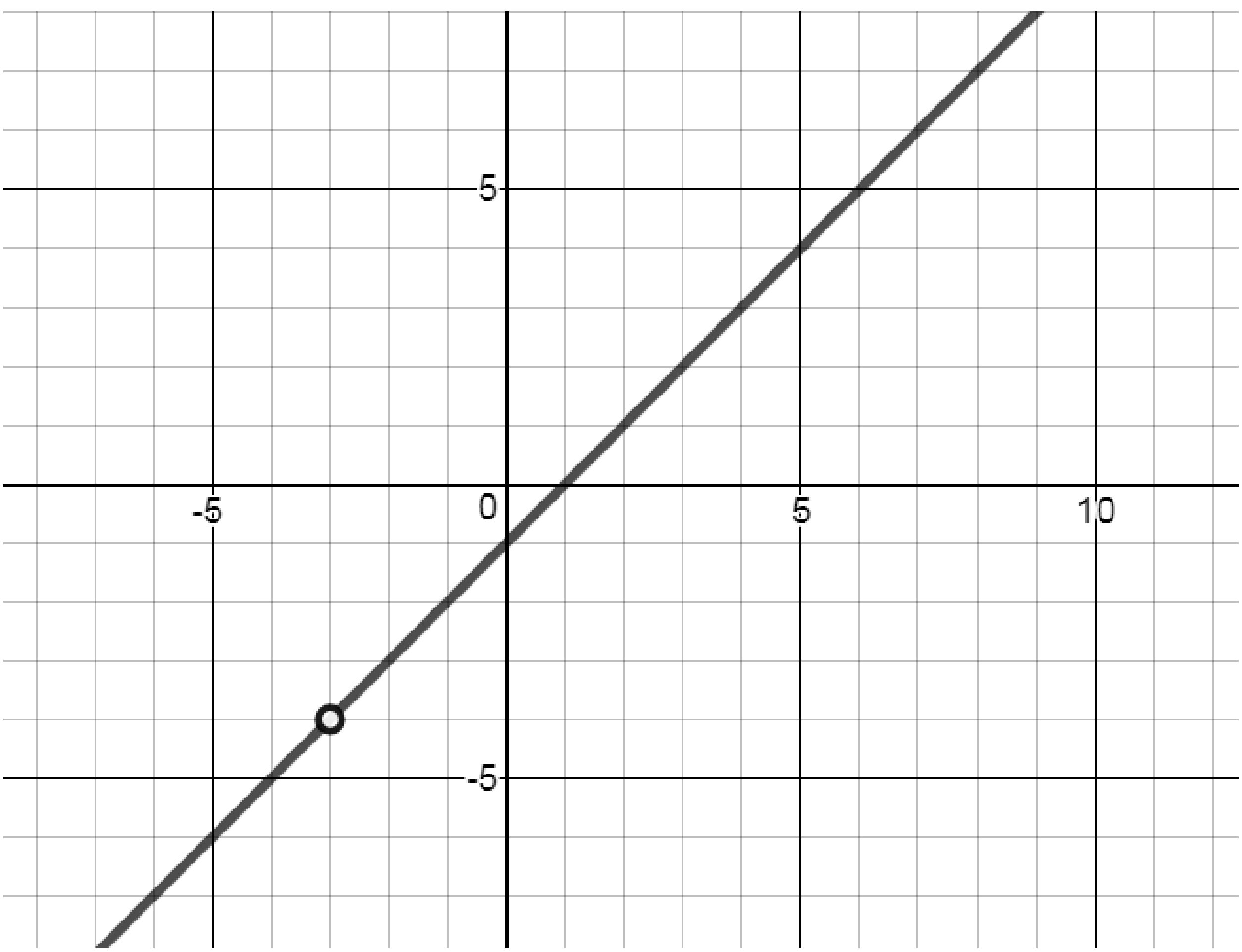
D: $[3,\infty)$

R: $[5,\infty)$

15.



16.



17.