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MATH D UNIT 3 REVIEW

INSTRUCTIONS:

Show all of your work on separate paper for credit; do not write answers on this review sheet. Number each problem in order on your paper and box your answers. Follow directions for each problem.

I. For each function given, find the domain. (See section 6.1)

1) $f(x)=\dfrac{x^2+x+1}{2x^2-5x+2}$ **2)** $g(x)=\dfrac{x^2-16}{x^2+9x+20}$

II. Using the functions given above, also find $f(-1)$, $f(2)$, $g(-2)$, $g(0)$, **and** $g(4)$.

III. Simplify the expressions below. (See section 6.1)

3) $\dfrac{10x+15}{6x^2+9x}$ **4)** $\dfrac{y^2+5y-14}{y^2+4y-21}$ **5)** $\dfrac{3x-1}{6x^2+x-1}$

6) $\dfrac{8x}{x-5}\bullet\dfrac{x^2-25}{2x}$ **7)** $\dfrac{x^2-9x-36}{3x+9}\bullet\dfrac{-6x+6}{x^2-11x+10}$ **8)** $\dfrac{3x-9}{x^2-4x-12}\div\dfrac{9x-27}{x^2-3x-18}$

IV. Perform the operations and simplify your answer. (See sections 6.1, 6.2)

9) $\dfrac{-5x^2-3}{x^3-8}+\dfrac{7x^2-4x+3}{x^3-8}$ **10)** $\dfrac{3x^3-5}{x^2-2x-3}+\dfrac{6-2x^3}{x^2-2x-3}$ **11)** $\dfrac{3x^3+5}{2x^2+5x-3}+\dfrac{5x^3-6}{2x^2+5x-3}$

12) $\dfrac{2}{x+2}-\dfrac{3x}{x^2-4}$ **13)** $\dfrac{x}{x^2-16}-\dfrac{8}{x^2+5x+4}$ **14)** $\dfrac{4x}{x^2+2x-3}+\dfrac{2-x}{x^2+x-6}$

V. Simplify the complex rational expression. (See section 6.3)

15) $\dfrac{\frac{x}{y^2}+\frac{1}{y}}{\frac{y}{x^2}+\frac{1}{x}}$ **16)** $\dfrac{\frac{4}{b}-\frac{2}{a}}{\frac{4a}{b}-\frac{b}{a}}$ **17)** $\dfrac{\frac{5}{x^3y}-\frac{8}{xy^4}}{\frac{6}{x^3y}+\frac{7}{x^2y^4}}$ **18)** $\dfrac{\frac{3}{x^2y}-\frac{5}{xy^3}}{\frac{2}{xy^2}+\frac{3x}{x^2y^2}}$

VI. Divide. (See section 6.4)

19) $\dfrac{15x^3-30x^2+10x-2}{5x^2}$ **20)** $\dfrac{36x^4y^3+12x^2y^3-60x^2}{6xy^2}$

21) $(8x^2y-6xy+3)\div 2xy$ **22)** $\left(10x^3-26x^2+17x-13\right)\div(5x-3)$

23) $\dfrac{6y^3+7y^2+12y-5}{3y-1}$ **24)** $\dfrac{2x^3-3x+4}{x+2}$

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VII. Solve the equations for the given variable. (See sections 6.6, 6.7)

25) $\frac{2x}{x-3}+\frac{6}{x+3}=\frac{-28}{x^2-9}$

26) $\frac{3x}{x+2}-\frac{5}{x}=\frac{3}{4}$

27) $\frac{3}{x}+2=\frac{2x}{x+3}$

28) $I=\frac{E}{R+r}$ **for** r

29) $P=\frac{R-C}{n}$ **for** C

30) $S=\frac{a}{1-r}$ **for** r

VIII. Solve the following problems. (See section 6.7)

31) Working together, Jay and Ethan can split a cord of firewood in **5** hours. Working alone, Jay can complete the job in **7** hours. How long would it take Ethan to split the firewood working alone?

32) It takes Sarah **3** hours to clean her bedroom. If her friend Diana helps her, they can both get the job done in **2** hours. How long would it take Diana to do the job by herself?

IX. Evaluate the expressions below without using a calculator. (See sections 7.1, 7.2)

33) $\sqrt{(-3)^2}$

34) $\sqrt{(-7)^2}$

35) $\sqrt[3]{(-44)^3}$

36) $-\sqrt{\frac{1}{49}}$

37) $\sqrt{-\frac{25}{4}}$

38) $\sqrt[3]{-\frac{27}{8}}$

39) $(-8)^{5/3}$

40) $(9)^{3/2}$

41) $(-27)^{4/3}$

42) $\frac{8^{7/6}}{8^{5/6}}$

43) $\frac{9^{5/7}}{9^{3/14}}$

44) $\frac{16^{7/10}}{16^{1/5}}$

X. Solve the following problems. (See section 7.2)

45) The Galapagos Islands, lying 600 miles west of Ecuador, are famed for their extraordinary wildlife. The function $f(x)=29x^{\frac{1}{3}}$ models the number of plant species, *f(x)*, on the various islands of the Galapagos chain in terms of the area, *x*, in square miles, of a particular island. Use the function to find how many species of plants are on a Galapagos Island that has an area of 37 square miles? Round to the nearest whole number.

46) The function $f(x)=70x^{\frac{3}{4}}$ models the number of calories per day, *f(x)*, a person needs to maintain life in terms of the person's weight, *x*, in kilograms. (1 kilogram is approx. 2.2 pounds.) Use this model and a calculator to calculate how many calories per day does a person who weighs 70 kilograms (approx. 154 pounds) need to maintain life? Round to the nearest calorie.

47) The function $f(x)=350x^{\frac{2}{3}}$ models the expenditures, *f(x)*, in millions of dollars, for the U.S. National Park Service *x* years after 1985. According to this model, what will the expenditures be in 2012, in millions of dollars?

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XIII. Do the following problems. (See section 7.1)

In the problems below, complete each table and graph the given function. Identify the function's domain and range. *Include a scale*.

48) $f(x)=\sqrt{x}-2$

x	$f(x)=\sqrt{x}-2$
0	
1	
4	
9	

49) $f(x)=\sqrt{4-x}$

x	$f(x)=\sqrt{4-x}$
-5	
0	
3	
4	

50) Graph each function by hand. Then describe the relationship between the graph of *h(x)* and the graph of *f(x). Include a scale.*

$f(x)=\sqrt{x}$ **and** $h(x)=\sqrt{x+3}$

x	$f(x)=\sqrt{x}$
0	
1	
4	
16	

x	$h(x)=\sqrt{x+3}$
-3	
-2	
1	
6	

XII. Simplify the expressions below. Assume all variables represent positive numbers. *Leave your answers with positive exponents*. (See section 7.2)

51) $\left(27y^{9/5}\right)^{1/3}$ **52)** $\left(4y^{8/3}\right)^{1/2}$ **53)** $\left(2x^{1/4}\right)^{4}$

54) $\left(\sqrt[3]{x^2}\right)\left(\sqrt[5]{x}\right)$ **55)** $\left(\sqrt[4]{x}\right)\left(\sqrt[5]{x^2}\right)$ **56)** $\dfrac{\sqrt[3]{y^2}}{\sqrt[6]{y}}$

XI. Simplify the expressions below. Assume all variables represent positive numbers. (See sections 7.3, 7.4)

57) $4\sqrt{3x}\bullet 2\sqrt{4x}$ **58)** $8y^2\sqrt{2y}\bullet 3\sqrt{10y}$ **59)** $2\sqrt{5x}\bullet 3\sqrt{15x}$

60) $\sqrt{12x^3y^4}$ **61)** $\sqrt[3]{8a^3b^4}$ **62)** $\sqrt[4]{32x^{16}y^{10}z^5}$

63) $5\sqrt{12}+6\sqrt{20}-2\sqrt{27}+\sqrt{75}$ **64)** $5\sqrt{10}-3\sqrt{40}$ **65)** $3\sqrt{2x^2}-7\sqrt{8x^2}+2x\sqrt{75}$

66) $\sqrt[4]{\dfrac{1}{16}}$ **67)** $\sqrt[4]{\dfrac{9}{y^8}}$ **68)** $\sqrt[3]{\dfrac{3}{x^3}}$ **69)** $-\sqrt[4]{\dfrac{81x}{z^{32}}}$

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Do no write answers or work out problems on this page, use separate paper.

MATH D UNIT 3 REVIEW ANSWERS

1) Domain = $\left(-\infty, \frac{1}{2}\right) \cup \left(\frac{1}{2}, 2\right) \cup (2, \infty)$ **2)** Domain = $(-\infty, -5) \cup (-5, -4) \cup (-4, \infty)$

$f(-1) = \frac{1}{9}$, $f(2)$ is undefined, $g(-2) = -2$, $g(0) = -\frac{4}{5}$, $g(4) = 0$

3) $\frac{5}{3x}$ **4)** $\frac{y-2}{y-3}$ **5)** $\frac{1}{2x+1}$

6) $4(x+5)$ **7)** $\frac{-2(x-12)}{x-10}$ **8)** $\frac{x+3}{3(x+2)}$

9) $\frac{2x}{x^2+2x+4}$ **10)** $\frac{x^2-x+1}{x-3}$ **11)** $\frac{4x^2+2x+1}{x+3}$

12) $\frac{-x-4}{(x-2)(x+2)}$ **13)** $\frac{x^2-7x+32}{(x-4)(x+1)(x+4)}$ **14)** $\frac{3x+1}{(x-1)(x+3)}$

15) $\frac{x^2}{y^2}$ **16)** $\frac{2}{2a+b}$ **17)** $\frac{5y^3-8x^2}{6y^3+7x}$ **18)** $\frac{3y^2-5x}{5xy}$

19) $3x - 6 + \frac{2}{x} - \frac{2}{5x^2}$ **20)** $6x^3y + 2xy - \frac{10x}{y^2}$

21) $4x - 3 + \frac{3}{2xy}$ **22)** $2x^2 - 4x + 1 - \frac{10}{5x-3}$

23) $2y^2 + 3y + 5$ **24)** $2x^2 - 4x + 5 - \frac{6}{x+2}$

25) x = -1, x = -5 **26)** $x = -\frac{10}{9}$, 4 **27)** $x = -1$

28) $r = \frac{E}{I} - R$ **or** $r = \frac{E - RI}{I}$ **29)** $C = R - Pn$ **30)** $r = 1 - \frac{a}{S}$ or $r = \frac{S-a}{S}$

31) 17.5 *hours* **32)** 6 *hours*

33) 3 **34)** 7 **35)** -44 **36)** $-\frac{1}{7}$

37) not a real number **38)** $-\frac{3}{2}$ **39)** -32 **40)** 27

41) 81 **42)** 2 **43)** 3 **44)** 4

45) 97 species of plants **46)** 1694 calories per day **47)** $3,150 million

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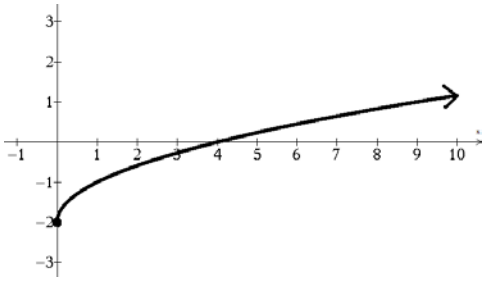
48)

x	*f (x)*
0	**-2**
1	**-1**
4	**0**
9	**1**

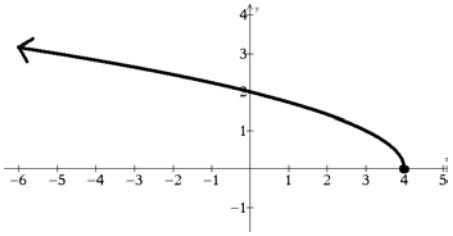


Domain: $\{x \mid x \geq 0\}\, or [0, \infty)$

Range: $\{y \mid y \geq -2\}\, or [-2, \infty)$

49)

x	*f (x)*
-5	**3**
0	**2**
3	**1**
4	**0**

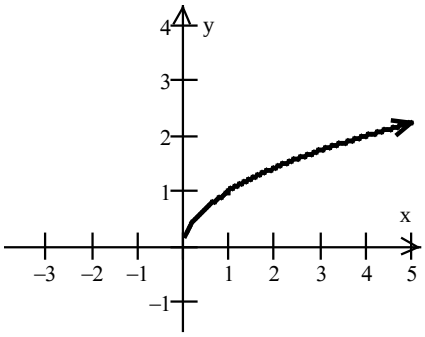


Domain: $\{x \mid x \leq 4\}\, or (-\infty, 4]$

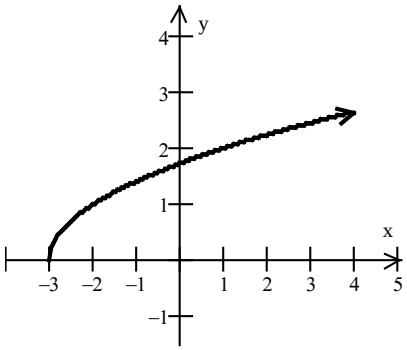
Range: $\{y \mid y \geq 0\}\, or [0, \infty)$

50) "The graph of h(x) is the graph of f(x) shifted left by 3 units."

$f(x) = \sqrt{x}$



$h(x) = \sqrt{x+3}$



51) $3y^{3/5}$

52) $2y^{4/3}$

53) $16x$

54) $\sqrt[15]{x^{13}}$

55) $\sqrt[20]{x^{13}}$

56) $\sqrt{y}$

57) $16x\sqrt{3}$

58) $48y^3\sqrt{5}$

59) $30x\sqrt{3}$

60) $2xy^2\sqrt{3x}$

61) $2ab\sqrt[3]{b}$

62) $2x^4y^2z\sqrt[4]{2y^2z}$

63) $9\sqrt{3}+12\sqrt{5}$

64) $-\sqrt{10}$

65) $-11x\sqrt{2}+10x\sqrt{3}$

66) $\frac{1}{2}$

67) $\frac{\sqrt[4]{9}}{y^2}$

68) $\frac{\sqrt[3]{3}}{x}$

69) $-\frac{3\sqrt[4]{x}}{z^8}$