

Question is from section:

No notes, books, electronic devices, or outside materials of any kind. Read each problem carefully and simplify your answers. Unless otherwise indicated, supporting work will be required on every problem; one-word answers will not receive full credit.

4.1

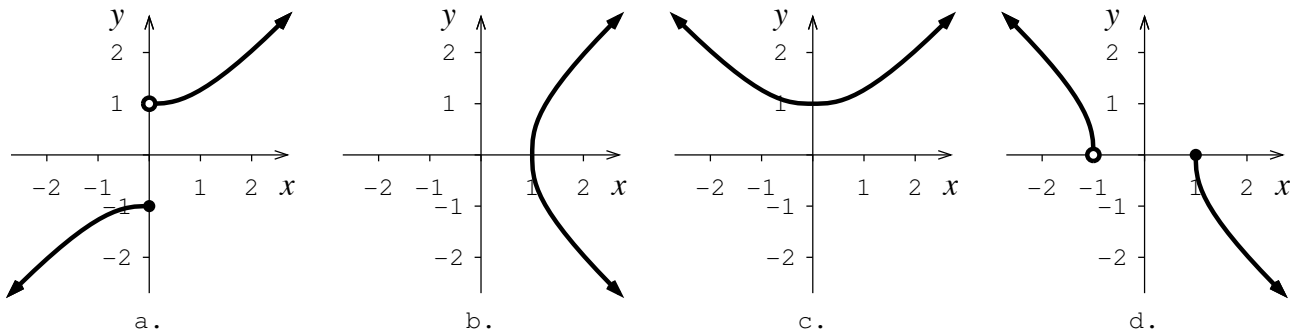
1 (6 pts). A wedding planner explains that the cost of renting a ballroom depends on how long your reception is going to last. To illustrate, she shows you the following table:

length of reception	2hr.	3hr.	4hr.	5hr.
cost of rental	\$400	\$460	\$520	\$580

Let C stand for the cost of the rental, and let t stand for the length of the reception. Express C as a linear function of t .

3.2, 6.2

2 (8 pts). Choose the statement that best describes the graph in each part.



- | | | |
|---|---|---|
| a. <input type="checkbox"/> a one-to-one function | <input type="checkbox"/> a function, but not one-to-one | <input type="checkbox"/> not a function |
| b. <input type="checkbox"/> a one-to-one function | <input type="checkbox"/> a function, but not one-to-one | <input type="checkbox"/> not a function |
| c. <input type="checkbox"/> a one-to-one function | <input type="checkbox"/> a function, but not one-to-one | <input type="checkbox"/> not a function |
| d. <input type="checkbox"/> a one-to-one function | <input type="checkbox"/> a function, but not one-to-one | <input type="checkbox"/> not a function |

R.5

3 (21 pts). Factor completely.

- a. $3x^4 - 33x^3 + 90x^2$ b. $x^3 - 27$ c. $25x^2 - 9$

R.8, R.1

4 (8 pts). Evaluate the expression:

- a. $16^{3/4}$ b. $\frac{1-3^{-1}}{1+25^{-1/2}}$

R.4 (a)

5 (16 pts). Solve for the inequality. Write your answer in interval notation.

1.6 (b)

- a. $\frac{2x+1}{x-5} \leq 1$ b. $|4 - 3x| > 5$

1.2 (a)

6 (21 pts). Solve for x .

6.2 (b)

- a. $x^2 + 3x - 6 = 0$ b. $16^x = \left(\frac{1}{8}\right)^{x+3}$ c. $\log_3(5x + 1) = 2$

6.4 (c)

7 (5 pts). Simplify the expression. $(\sqrt{3} + 3)(\sqrt{3} - 1)$

R.8

R.8

8 (10 pts). Simplify the expression. Assume that all variables are positive. $\sqrt[4]{(zx^2)^2y^5z^{10}}$

1.7, 8.1

9 (12 pts). A coffee retailer wishes to mix some Kenyan coffee that costs \$5 per pound with some Columbian that costs \$2 per pound to get 20 pounds of coffee that costs \$3.40 per pound. How many pounds of each coffee are required? Label your answers so I can tell which is which.

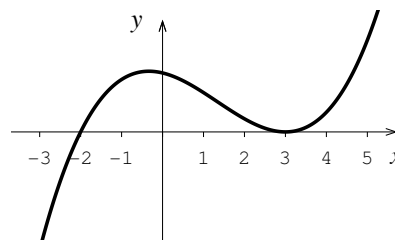
2.3

10 (8 pts). Find an equation of the line described in each part.

a. The line passing through the two points (4, 1) and (4, 9).

b. The line passing through the point (4, 1) and perpendicular to the line $y = 2x - 5$.

5.1

11 (15 pts). Construct a polynomial function of degree three that might have the given graph. Write your answer in the form $f(x) = ax^3 + bx^2 + cx + d$.

2.4

12 (6 pts). Find the center and radius of the circle:

$$x^2 - 4x + y^2 = 9$$

4.5, 5.4, 6.3(a)

13 (15 pts). Find the domain of the given function. Write your answer in interval form.

a. $\ln(5 - x)$ b. $\sqrt{x^2 + 9x + 20}$

5.2, 6.1, 6.2

14 (24 pts). Suppose $f(x) = \frac{3x}{x-4}$ and $g(x) = \frac{2}{x+5}$. Find the following.a. The domain of $f(x)$. Write your answer in interval form. b. $(f \circ f)(2)$ c. $(f \circ g)(x)$ d. $f^{-1}(x)$

6.4

15 (3 pts). Change $r^2 = 4.7$ to an equivalent statement involving a logarithm.

6.4

16 (12 pts). Evaluate the logarithm:

a. $\log_3 1 =$ b. $\ln \sqrt[5]{e} =$ c. $\log 0.001 =$

6.5

17 (10 pts). Find the exact value of each expression.

a. $\log_\pi(\pi^{-2})$ b. $8^{\log_8 11 - \log_8 4}$

↑ You won't be provided this information on your exams

1. Slope = $\frac{\Delta C}{\Delta t} = \frac{460-400}{3-2} = 60$. (line in pt-slope: $C-400 = 60(t-2)$)

C as a function of t: $C = 400 + 60(t-2)$.

2. a. 1-1 b. not a function c. function, but not 1-1 d. 1-1.

(a, d pass both HLT & VLT. c. passes VLT only. d. fails VLT.)

3.a $3x^2(x^2-11x+30) = 3x^2(x-5)(x-6)$

b. $x^3-27 = (x-3)(x^2+3x+9)$ (difference of cubes formula)

c. $25x^2-9 = (5x-3)(5x+3)$ (" " squares ")

4.a. $16=2^4$. $(2^4)^{3/4} = 2^{4 \cdot \frac{3}{4}} = 2^3 = 8$

b. $(1-1/3) \div (1 + \frac{1}{\sqrt{25}}) = (\frac{2}{3}) \div (\frac{6}{5}) = \frac{2}{3} \cdot \frac{5}{6} = \frac{1 \cdot 5}{3 \cdot 3} = \frac{5}{9}$.

5a. $\frac{2x+1}{x-5} - 1 \leq 0$; $\frac{2x+1}{x-5} - \frac{(x-5)}{x-5} = \frac{x+6}{x-5} \leq 0$, sign chart.

$\frac{x+6}{x-5}$ --- 0 + + + +
 --- - - - - 0 + +

$\frac{x+6}{x-5}$ + 0 - UND +
 -6 5

$\frac{x+6}{x-5} \leq 0$ on $(-\infty, -6] \cup (5, \infty)$.

b. $|4-3x| > 5$ means

$4-3x < -5$ or $4-3x > 5$ graph:
 $9 < 3x$ or $-1 > 3x$
 $3 < x$ or $-1/3 > x$ $(-\infty, -1/3) \cup (3, \infty)$

6a. $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a} = \frac{-3 \pm \sqrt{9-4 \cdot 1 \cdot (-6)}}{2} = \frac{-3 \pm \sqrt{33}}{2}$

b. $(2^4)^x = (2^{-9})^{x+3}$; $2^{4x} = 2^{-3(x+3)} \Rightarrow 4x = -3x-9$; $7x = -9$
 $+3x$ $+3x$ $x = -9/7$.

c. $5x+1 = 3^2 = 9$; $5x = 9-1 = 8$; $x = 8/5$.

7. $(\sqrt{3}+3)(\sqrt{3}-1) = (\sqrt{3})^2 - \sqrt{3} + 3\sqrt{3} - 3 = 3 - \sqrt{3} + 2\sqrt{3} - 3 = \sqrt{3}$.

8. $\sqrt[4]{2^2 x^4 y^5 z^{10}} = (2^2 x^4 y^5 z^{10})^{1/4} = 2^{2/4} x^{4/4} y^{5/4} z^{10/4} = 2^{1/2} x^1 y^{1+1/4} z^{5/2}$
 $= 2^{1/2} x y^{5/4} z^{5/2}$

9. Let x = amount of Kenyan coffee in lbs, y = amt Columbian (lbs)
 Total weight: $x + y = 20$. Total cost: $5x + 2y = 20(3.40) = 68$.

Solve as in §8.1 $y = 20 - x$. $5x + 2(20 - x) = 68$

$$5x + 40 - 2x = 68 ; 3x = 28$$

$$x = \frac{28}{3} \text{ (or 9 and } \frac{1}{3}\text{)}, y = 20 - \frac{28}{3} = \frac{60}{3} - \frac{28}{3} = \frac{32}{3} \text{ (or 10 and } \frac{2}{3}\text{)}.$$

10. a. Slope = $\frac{9-1}{4-4}$ undefined. Line is vertical. Equation is $x = 4$.

b. Slope of $y = 2x - 5$ is 2, so slope of line in question is $-\frac{1}{2}$.

Equation in point-slope: $y - 1 = -\frac{1}{2}(x - 4)$.

11. f has a zero of multiplicity 1 @ $x = -2$ and
 a zero of multiplicity 2 @ $x = 3$.

$f = (x + 2)(x - 3)^2$. Expand:

$$= (x + 2)(x^2 - 6x + 9) = \frac{x^3 - 6x^2 + 9x + 2x^2 - 12x + 18}{x^3 - 4x^2 - 3x + 18}$$

(or any positive multiple of this to have same end behavior.)

12. Complete the square $x^2 - 4x + 4 + y^2 = 9 + 4$; $(x - 2)^2 + y^2 = 13$.

Center is $(2, 0)$. Radius = $\sqrt{13}$.

13. a. Need $5 - x > 0$ or $5 > x$. Domain = $(-\infty, 5)$.

b. Need $x^2 + 9x + 20 \geq 0$. (Factor, make sign chart)

$$(x + 4)(x + 5) \geq 0$$

$$x + 4 \quad - \quad - \quad - \quad 0 \quad + \quad + \quad +$$

$$x + 5 \quad - \quad - \quad - \quad 0 \quad + \quad + \quad +$$

$$\frac{(x + 4)(x + 5) \quad + \quad 0 \quad - \quad 0 \quad +}{-5 \quad -4}$$

$$\text{Domain} = (-\infty, -5] \cup [-4, \infty).$$

14. a. $x \neq 4$. Domain is $(-\infty, 4) \cup (4, \infty)$.

b. $f(f(2)) = f\left(\frac{3 \cdot 2}{2-4}\right) = f(-3) = \frac{3(-3)}{-3-4} = \frac{-9}{-7} = \frac{9}{7}$.

c. $f(g(x)) = \frac{3g(x)}{g(x)-4} = \frac{3 \cdot \frac{2}{x+5}}{\frac{2}{x+5}-4} \cdot \frac{x+5}{x+5}$

$$= \frac{3 \cdot 2}{2-4(x+5)} = \frac{3 \cdot 2}{-4x-18} = \frac{3 \cdot 2}{2(-2x-9)} = \frac{-3}{2x+9}$$

d. $y = \frac{3x}{x-4}$. (Solve for x) $y(x-4) = 3x$; $xy - 4y = 3x$

$$xy - 3x = 4y. \quad x(y-3) = 4y. \quad x = \frac{4y}{y-3} = f^{-1}(y), \text{ so } f^{-1}(x) = \frac{4x}{x-3}$$

15. $r^2 = 4.7$ means $\log_r(4.7) = 2$.

16 a. $\log_3 t = 0$ (b.c. $3^0 = 1$) b. $\ln e^{1/5} = \frac{1}{5}$.

c. $\log_{10} .001 = \log_{10} .001 = -3$, b.c. $.001 = 10^{-3}$.

17 a. $\log_{\pi}(\pi^{-2}) = -2$. b. $8^{(\log_8 11 - \log_8 4)} = 8^{\log_8(11/4)} = 11/4$.