
REVIEW TEST 1 - Chapters 1, 2, 3, 4

CHAPTER 1

Handout: Review Chapter 1 – Exercises # 5, 12, 13 (see website for handout).

Homework #1: Textbook Review page 91 – All homework problems

CHAPTER 2**Functions and Algebra of Functions**

1) Which of the following tables define the second variable as a function of the first variable? Explain why or why not.

| X | t |
|-----|-----|
| -1 | 2 |
| 0 | 9 |
| 1 | -2 |
| 0 | -3 |
| -1 | 5 |

| Adjusted gross income (I) | Tax bracket (T) |
|-------------------------------|---------------------|
| 0 – 2479 | 0% |
| 2480 – 3669 | 11% |
| 3670 – 4749 | 12% |
| 4750 – 7009 | 14% |
| 7010 – 9169 | 15% |
| 9170 – 11,649 | 16% |
| 11,650 – 13,919 | 18% |

| Temperature (T) | Humidity (h) |
|---------------------|------------------|
| Jan.1 $34^\circ F$ | 42% |
| Jan.2 $36^\circ F$ | 44% |
| Jan 3 $35^\circ F$ | 47% |
| Jan 4 $29^\circ F$ | 50% |
| Jan5 $31^\circ F$ | 52% |
| Jan.6 $35^\circ F$ | 51% |
| Jan.7 $34^\circ F$ | 49% |

2)

- What is the definition of a function?
- Give an example of a function (use function notation):
- What is the domain of a function (the definition) ? In particular, what is the domain of your function (your example from part b) ?
- What is the range of a function (the definition)? In particular, what is the range of your function (your example from part b)?

3) Let $f(x) = \frac{5}{(x-2)^2}$, $g(x) = \frac{1}{36x^3}$, $G(x) = \sqrt{7x-9}$, and $h(x) = \frac{7x+3}{4(1-x)}$.

Find the following and simplify (don't give approximate answers) :

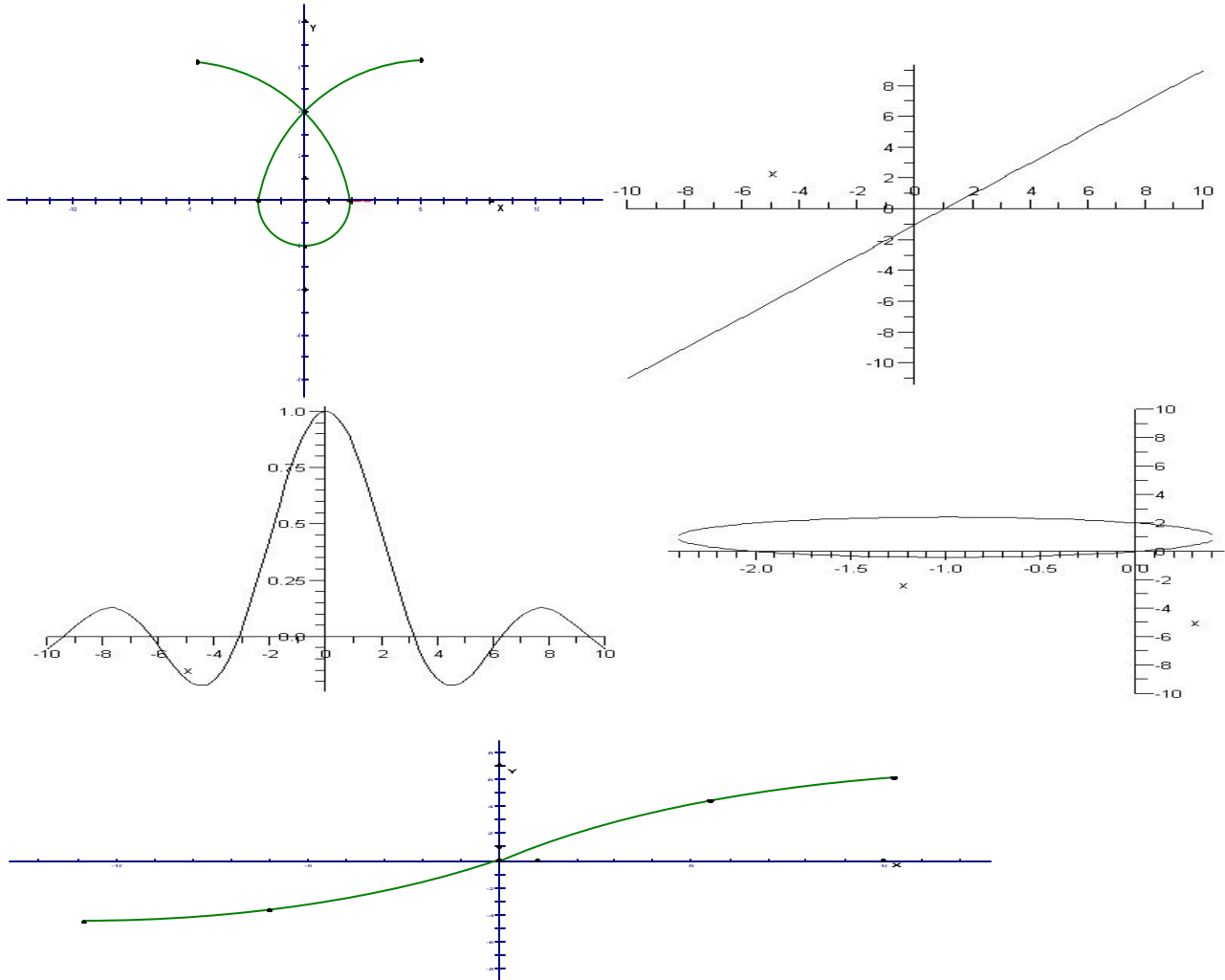
- The domain of each function.
- $g(a+1)$, $g(a)+1$, $h\left(\frac{5}{7}\right)$, $f(x+2)$, and $h(x-1)$

4) Let $f(x) = \begin{cases} 1-x^2, & x \leq 0 \\ 2x+1, & x > 0 \end{cases}$. a) Evaluate $f(-2)$ and $f(1)$.

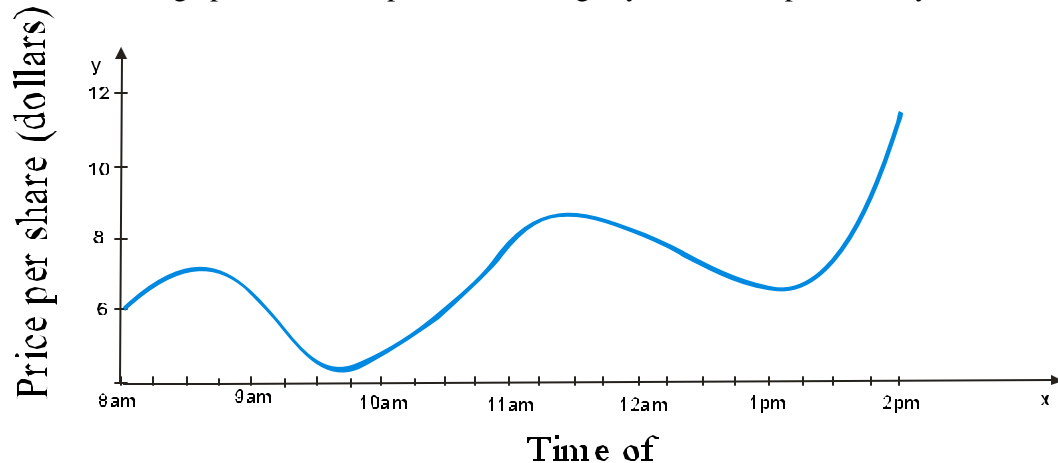
5) If $f(x) = x^2 + 2x - 1$ and $g(x) = 2x - 3$, find each of the following:

- what is the domain of f and g ;
- What is the range of g ?
- $f(g(2))$;
- Find $(f+g)(x)$
- $(fg)(x)$
- $(f-g)(3)$

6) Which of the graphs represent y as a function of x ? Explain why or why not. Give the domain and range for each function.



7) The value of a stock varies during the course of any trading day. The price per share “P” of a certain stock is shown on the graph below for a particular trading day. Note “t” represents any time between 8 am and 2 pm.



a) Is “t” (the time of the day) a function of “P” (the price per share)? Is “P” a function of “t”? Explain using the definition of function.

Using the graph, estimate the answers to the following questions (Use the correct units).

b) What is the domain? What is the range?

c) For what value(s) of “t” does $P(t)=8$ and what does it mean in practical terms?

d) What is $P(11)$ and what does it mean in practical terms?

e) For what value(s) of “t” is $P(t) > 5.50$?

8) Find $f + g$, $f - g$, fg , and f/g :

a) $f(x) = \frac{1}{x+1}$, $g(x) = \frac{x}{x+1}$; b) $f(x) = x^3 + 2x^2$, $g(x) = 3x^2 - 1$

Handout Sections 2.1 & 2.2 - Exercises # 1, 2, 3, 6 – 11

Handout: Sections 2.3 & 2.4 – All exercises

Homework #2: all homework problems

CHAPTER 3
Systems of Linear Equations

Homework #3: all homework problems

CHAPTER 4
Inequalities and Problem Solving

1) Solve the following inequalities; graph the solution set; write the solution set in interval notation.

a) $-\frac{2}{3}(2x + \frac{3}{2}) \geq 14$; b) $-\frac{2}{5} < \frac{x-4}{3} \leq 4$; c) $\frac{1}{2}x - 3 > 2x + 3(x - \frac{1}{3})$;
d) $2(x+2) \geq \frac{1}{5} + 2x$ e) $\frac{2x+3}{3} + \frac{3x-4}{2} > \frac{x-2}{2}$

2) Solve the following:

a) $\left|3x + \frac{1}{2}\right| = \frac{5}{3}$, b) $\left|x - \frac{1}{4}\right| = |x + 2|$, c) $\left|2x + \frac{4}{7}\right| + 1 = 2$, d) $|2x + 1| < -2$; i) $3|2x + 5| > 9$
e) $\left|\frac{3}{5}x - 2\right| - \frac{1}{2} \geq 4 + \frac{1}{2}$, f) $|x - 1| + 4 \leq 11$, g) $|x| + 7 \geq 7$, h) $-|3x + 2| - \frac{1}{2} > 2$, j) $\left|\frac{x+1}{x+8}\right| = \frac{2}{3}$

3) For what values of k does $|x| + k = 0$ have:

a) exactly one solution; b) exactly two solutions; c) no solution. Provide an example for each case.

4) Maria is investing in the hotel business. She has bought two hotels and will expand her investment when her total profit from the two hotels is at least \$10,000.

- a) Write an inequality to model the problem.
b) Graph the solutions set.
c) What does $(-1000, 12,000)$ mean in the context of the problem?
d) What does $(5000, 4000)$ mean in the context of the problem?

Homework #3: All homework problems

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ANSWERS:

Chapter 2:

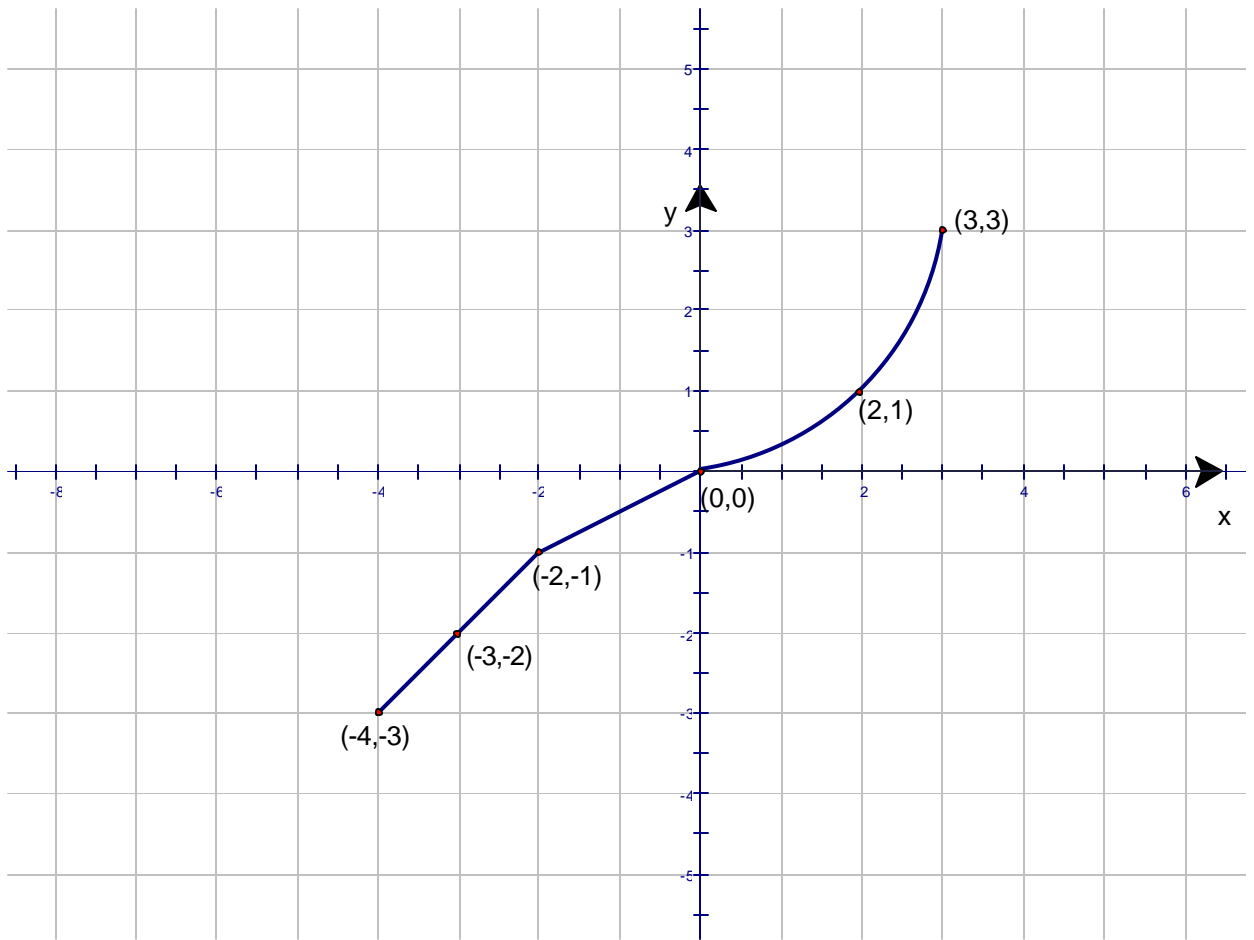
(1) 2nd; (3) a) $D_g = \mathbb{R} \setminus \{0\}$, $D_h = \mathbb{R} \setminus \{1\}$; b) $g(a) + 1 = \frac{1 + 36a^3}{36a^3}$, $g(a+1) = \frac{1}{36(a+1)^3}$;

(4) $f(-2) = -3$, $f(1) = 3$; (5) a) all real numbers; b) all real numbers; d) 1. (6) 2nd, 3rd, and 5th represent y as a function of x.

Chapter 4: (1) a) $x \leq -\frac{45}{4}$; b) $\frac{14}{5} < x \leq 16$; d) $x \in \mathbb{R}$; e) $x > 0$; (2) a) $x \in \left\{ \frac{7}{18}, \frac{-13}{18} \right\}$; b) $x = -\frac{7}{8}$; c)

$x \in \left\{ \frac{3}{14}, -\frac{11}{14} \right\}$; d) $x \in \emptyset$; e) $x \geq \frac{35}{3}$ or $x \leq -5$; f) $-6 \leq x \leq 8$; g) $x \in \mathbb{R}$; h) $x \in \emptyset$; i) $x > -1$ or $x < -4$.

1)

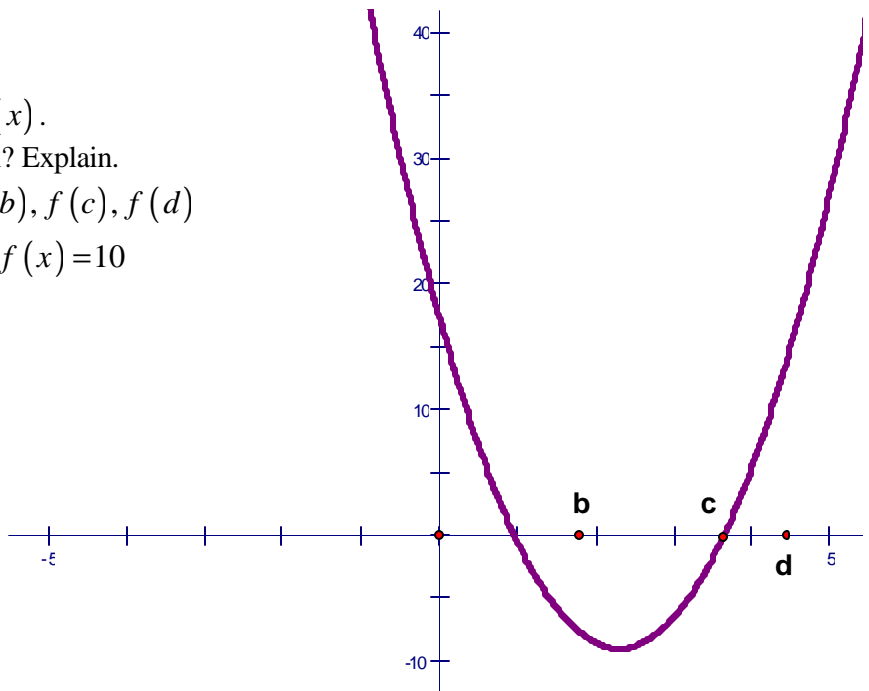


Using the graph $y = f(x)$ shown, answer the following:

- Is y a function of x ? Explain.
- Find the domain and range of f .
- List the intercepts (as ordered pairs).
- Find $f(-2)$.
- For what values of x does $f(x) = -3$?
- Solve $f(x) > 0$.

2. The graph in the figure defines $f(x)$.

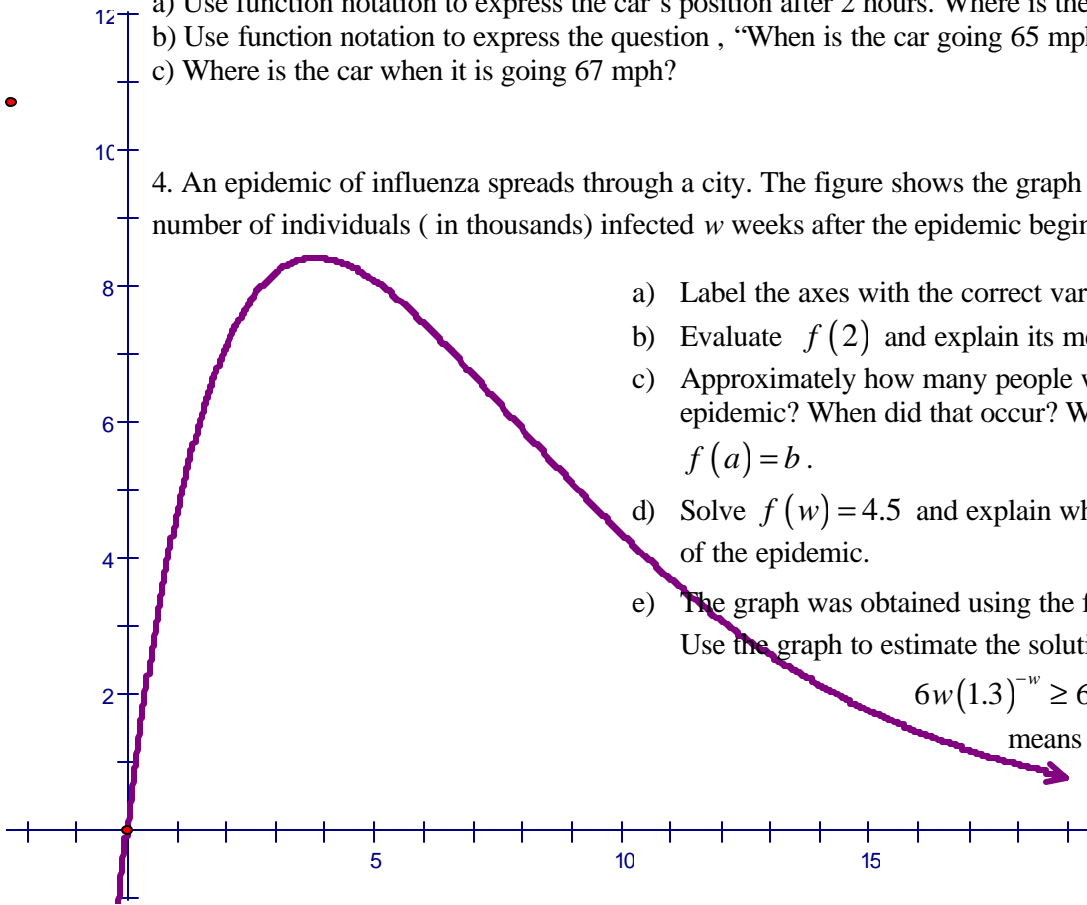
- Does the graph represent a function? Explain.
- Use it to estimate: $f(0)$, $f(1)$, $f(b)$, $f(c)$, $f(d)$
- Estimate the values of x for which $f(x) = 10$



3. Let $s(t) = 11t^2 + t + 100$ be the position, in miles, of a car driving on a straight road at time t , in hours. The car's velocity at any time t is given by $v(t) = 22t + 1$.

- Use function notation to express the car's position after 2 hours. Where is the car then?
- Use function notation to express the question, "When is the car going 65 mph?"
- Where is the car when it is going 67 mph?

4. An epidemic of influenza spreads through a city. The figure shows the graph of $I = f(w)$, where I is the number of individuals (in thousands) infected w weeks after the epidemic begins.



- Label the axes with the correct variables.
- Evaluate $f(2)$ and explain its meaning in terms of the epidemic.
- Approximately how many people were infected at the height of the epidemic? When did that occur? Write your answer in the form $f(a) = b$.
- Solve $f(w) = 4.5$ and explain what the solutions mean in terms of the epidemic.
- The graph was obtained using the formula $f(w) = 6w(1.3)^{-w}$. Use the graph to estimate the solution of the inequality $6w(1.3)^{-w} \geq 6$. Explain what the solution means in terms of the epidemic.

5. If V is the value of a computer equipment t years after the equipment is purchased, find a formula for V in terms of t . Assume that the value of the new equipment is \$20,000 and that the value drops to \$0 after five years have elapsed.

6. Suppose you can type four pages in 50 minutes and nine pages in an hour and forty minutes.

- Find a linear function for the number of pages produced, p , as a function of time, t . If time is measured in minutes, what values of t make sense in this example?
- How many pages can be typed in two hours?
- Interpret the slope of the function in practical terms.
- Solve the function in (a) for time as a function of pages.
- How long will it take to type a 15 page paper?

7. The cost in dollars of renting a car for one day from three different rental agencies and driving it d miles is given by the following equations:

$$C_1 = 50 + 0.10d$$

$$C_2 = 30 + 0.20d$$

$$C_3 = 0.50d$$

- Explain the meaning of each equation.
- Graph all equations on the same coordinate system. Label the axes and all points used.
- Which agency is cheapest?

