

Review Test #1 – Chapters 1& 2 & Section 3.1

To prepare for the test, you may study:

- Quiz #1
- Handout Review Chapter 1: # 1, 2, 3, 4, 5, 8, 9, 10
- Handout 2.3 Functions: # 4, 5, 6, 9, 10, 11
- Handout Sections 2.4 & 2.5 # 1 – 8
- Handout Section 2.6: The graphs of all basic functions
- Handout 2.7: All examples and exercises
- Homework #1: Summary page 146 – all even
- Homework #2, 3: All exercises from homework sheet
- Handout Section 3.1 – Quadratic Functions – Exercises # 1, 2, 3, 4, 5, 6, 7 (see website for handout and solutions)

More applications

1) Let $A(-7, -4)$ and $B(4, -1)$ be two points in a plane. Find the following and sketch an appropriate figure:

- a) An equation of the circle with diameter AB . Show how you obtain the equation.
- b) Does the equation from (a) represent y as a function of x ? Explain.
- c) Find the exact x - and y -intercepts (if any).
- d) Find the equation of the line AB .
- e) Does the equation from (d) represent y as a function of x ? Explain. Find the domain and range of the relation.

2) Sketch the graph of the following piece-defined functions. Show all work.

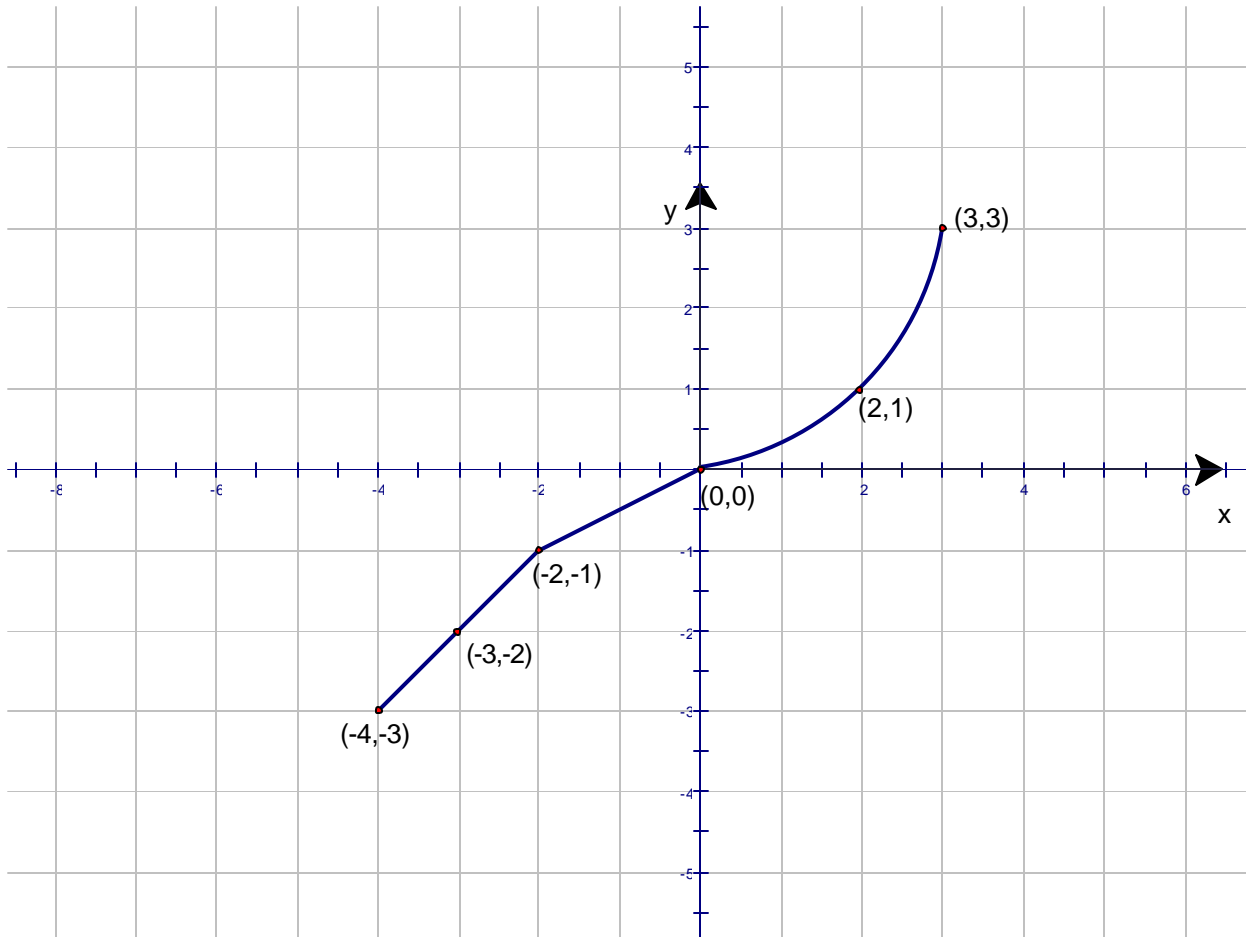
$$f(x) = \begin{cases} x+1, & -2 \leq x < 0 \\ \sqrt{x}, & 0 \leq x \leq 1 \\ x^3, & 1 < x < 2 \end{cases} \quad f(x) = \begin{cases} 2, & \text{if } x < -3 \\ -2x+1, & \text{if } -3 \leq x \leq 2 \\ x-2, & \text{if } 2 < x < 6 \end{cases}$$

- a) What is the domain and range of each function?
- b) Find $f\left(\frac{1}{2}\right)$, $f\left(-\frac{1}{2}\right)$, and $f\left(\frac{3}{2}\right)$.
- d) On what intervals is the function increasing, decreasing, constant?
- e) Calculate $f(f(1))$, $(f \circ f)(-1)$, and $(f \circ f)(0)$.

3. Let $f(x) = \sqrt{x^2 + 16} - 5$.

- a) What is the domain of this function? What is the range?
- b) Find $f(0)$.
- c) Find the x - and y -intercepts of the graph.

4)



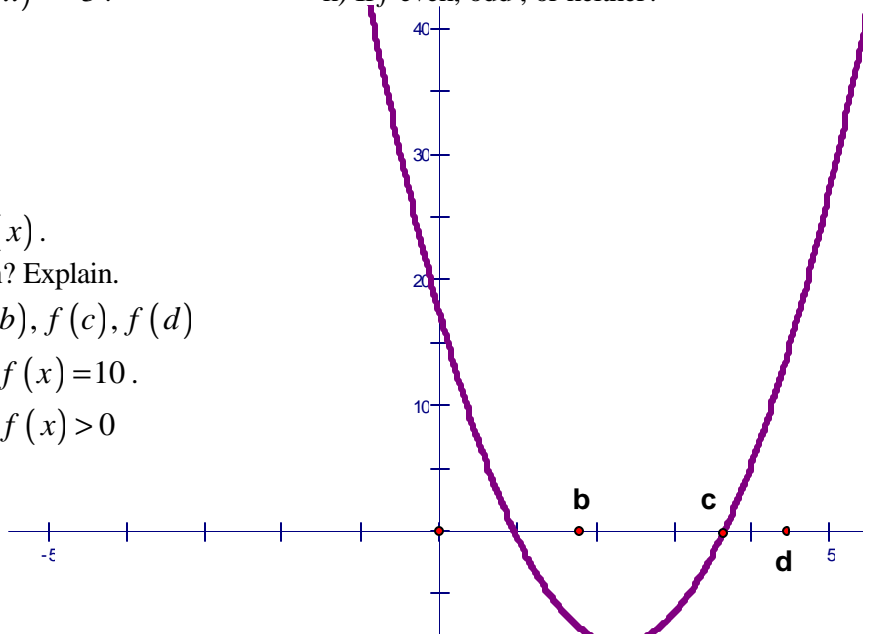
Using the graph $y = f(x)$ shown, answer the following:

- 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 $f(x) > 0$.

- Find $(f \circ f)(-3)$
- Graph $y = f(x-2)$
- Graph $y = f(x) - 2$
- Graph $y = f(-x)$
- If f even, odd, or neither?

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

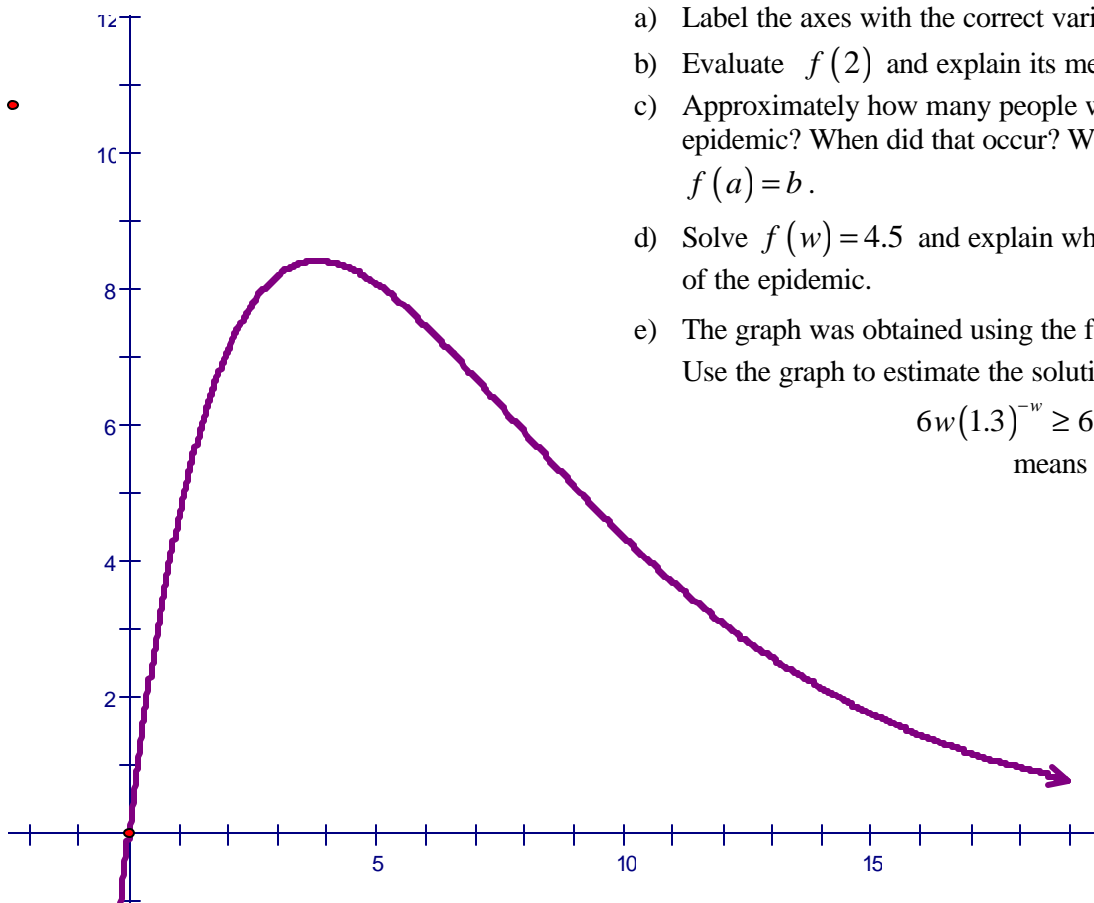
- Does the graph represent a function? Explain.
- Use it to estimate: $f(0)$, $f(1)$, $f(b)$, $f(c)$, $f(d)$
- Estimate the values of x for which $f(x) = 10$.
- Estimate the values of x for which $f(x) > 0$



6. 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?

7. 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.