

MSLC – Math 1148
Exam 1 Review

Disclaimer: This should NOT be used as your only guide for what to study.

1. Use the piece-wise defined function $f(x) = \begin{cases} x^2 + 2 & \text{if } x \leq 0 \\ -2x + 4 & \text{if } x \geq 3 \end{cases}$ to answer the following:

- Compute $f(0)$, $f(3)$, $f(-1)$, and $f(4)$.
- Plot the points you found above and sketch a complete graph of $y = f(x)$.
- Find the domain of f . Write your answer using interval notation.

2. Determine whether or not each equation is a function of x .

- $y = x^2 - 3x + 4$
- $x^2 + y^2 = 1$
- $x^2 + y^3 = 4$
- $xy = 1$

3. Use your graphing calculator to graph each of the functions below over the interval $(-2, 2)$ and approximate any local extrema. Also, determine the intervals where the functions are increasing and decreasing.

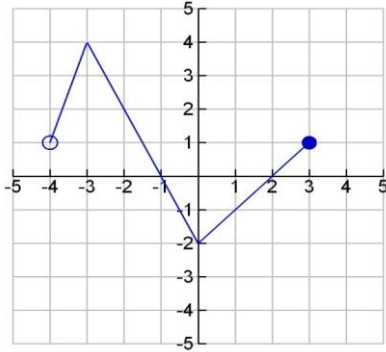
Round your answers to three decimal places where appropriate.

- $f(x) = x^2$
- $g(x) = (x-1)^2(x+1)^2$
- $h(x) = \sqrt{|x|}$
- $k(x) = x(x-1)(x+1)$

4. Solve the following inequalities algebraically. Give your answers in interval notation.

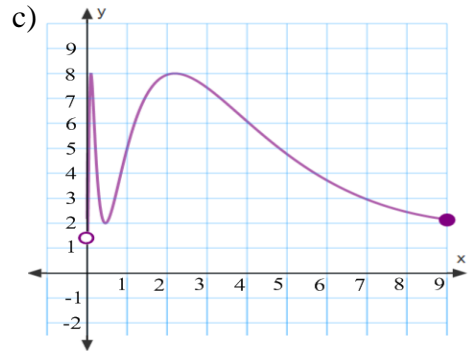
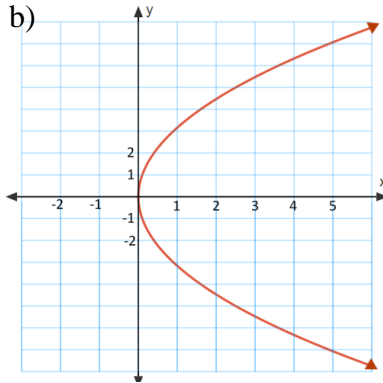
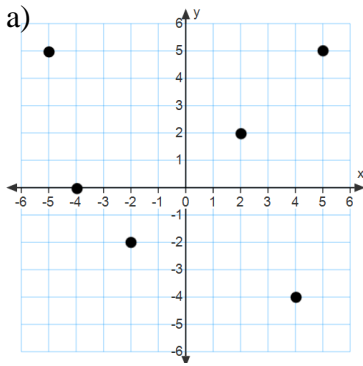
- $5(1-2x) \leq 9(x-3)$
- $-7 < 5x + 8 \leq 28$
- $|4x+1| < 17$
- $|2x-1| \geq 5$
- $-21 \leq 3(x+2) < 18$
- $|7+2x| \leq 11$
- $|8x-5| > 13$

5. The graph below represents the graph of a function f .



- Evaluate $f(2)$.
- Determine all values of x that produce $f(x) = 1$.
- Determine the domain of f using interval notation.
- Determine the range of f using interval notation.

6. Find the domain and range (in interval notation) of each of the following graphs of relations, and determine if that relation is also a function:



7. Find the domain of each of the following functions. Give your answer in interval notation.

a) $f(x) = \frac{(x-5)(x+95)}{8(8x+5)(x-3)}$

b) $g(x) = \sqrt{3(x-11)}$

c) $h(x) = \frac{x^2 - 4}{x^2 - 10x - 24}$

d) $j(x) = \sqrt{3-2x}$

e) $k(x) = \sqrt[3]{x-7}$

8. Use the piece-wise defined function $f(x) = \begin{cases} x^2 + 4x + 4 & \text{if } x < 0 \\ -\frac{1}{2}x + 2 & \text{if } x \geq 2 \end{cases}$ to answer the following:

- Compute $f(-3)$, $f(-2)$, $f(-1)$, $f(2)$, and $f(4)$.
- Plot the points you found above and sketch a complete graph of $y = f(x)$.
- Find the domain of f . Write your answer using interval notation.

9. Determine the average rate of change of the functions between the given values of x .

a) $h(x) = 3x - 17$ from $x = -1$ to $x = 2$

b) $f(x) = \frac{2x}{3x+1}$ from $x = 1$ to $x = t$

c) $g(x) = \frac{1}{\sqrt{x+1}}$ from $x = 0$ to $x = a$

10. Write the equation of the function $F(x) = \sqrt{x}$ transformed in the following ways:

- shifted 2 units to the left, and shifted up 3 units
- reflected about the x -axis, then shifted down 3 units
- shifted 1 unit to the right, and vertically stretched by a factor of 3
- Horizontally stretched by a factor of 3, then reflected across both the x -axis and the y -axis

11. A boat on a river travels downstream for 20 miles in one hour. The return trip back upstream takes 2.5 hours. How fast does the boat travel in still water, and how fast is the current?

12. A fruit stand sells a box of Strawberries for \$7 and a box of Kiwi fruit for \$10. If they sold a total of 135 boxes of fruit and had revenue of \$1110, how many boxes of each fruit did they sell?

13. Solve the following system of linear equations:

a) $\begin{cases} 3x + 2y = 0 \\ -x - 2y = 8 \end{cases}$ b) $\begin{cases} 15x - 6y = 9 \\ 2y - 5x = 14 \end{cases}$ c) $\begin{cases} x - 2y + 3z = 1 \\ x + 2y - z = 13 \\ 3x + 2y - 5z = 3 \end{cases}$

14. Write the equation of the line having the given properties:

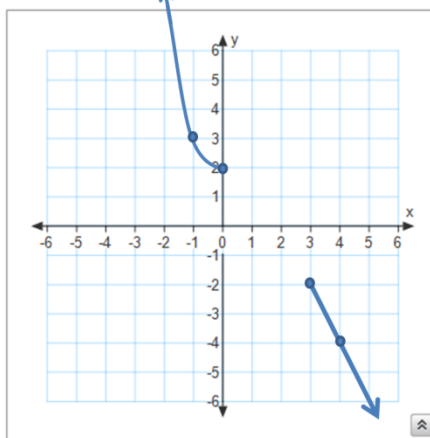
- point-slope form; passing through the points (2, 7) and (-1, -2)
- slope-intercept form; passing through (6, -1) and perpendicular to $4x - 3y = -21$
- no slope; passing through the point (8, 13)

Exam 1 Review Solutions

1. a) $f(0) = 2$; $f(3) = -2$;
 $f(-1) = 3$; $f(4) = -4$

c) Domain: $(-\infty, 0] \cup [3, \infty)$

b)



2. a) Function b) Not a function c) Function d) Function

3. a) Min: $(0, 0)$; Increasing: $(0, 2)$; Decreasing: $(-2, 0)$

b) Mins: $(-1, 0)$ & $(1, 0)$; Max: $(0, 1)$; Increasing: $(-1, 0) \cup (1, 2)$; Decreasing: $(-2, -1) \cup (0, 1)$

c) Min: $(0, 0)$; Increasing: $(0, 2)$; Decreasing: $(-2, 0)$

d) Min: $(0.578, -0.385)$; Max: $(-0.578, 0.385)$;

Increasing: $(-2, -0.578) \cup (0.578, 2)$; Decreasing: $(-0.578, 0.578)$

4. a) $\left[\frac{32}{19}, \infty\right)$ b) $(-3, 4]$ c) $\left(-\frac{9}{2}, 4\right)$ d) $(-\infty, -2] \cup [3, \infty)$

e) $[-9, 4)$ f) $[-9, 2]$ g) $(-\infty, -1) \cup \left(\frac{9}{4}, \infty\right)$

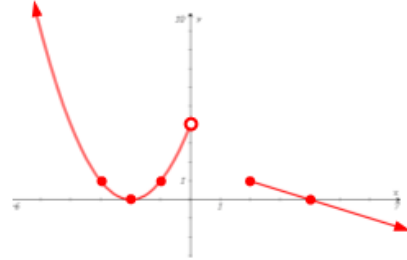
5. a) $f(2) = 0$ b) $x = -1.5$ or $x = 3$ (The function doesn't include $x = -4$)

c) D: $(-4, 3]$ d) R: $[-2, 4]$

6. a) Domain: $\{-5, -4, -2, 2, 4, 5\}$	b) Domain: $[0, \infty)$	c. Domain: $(0, 9]$
Range: $\{-4, -2, 0, 2, 5\}$	Range: $(-\infty, \infty)$	Range: $(1.5, 8]$
It's a function	Not a function	It's a function

7. a) $(-\infty, -\frac{5}{8}) \cup (-\frac{5}{8}, 3) \cup (3, \infty)$ b. $[11, \infty)$ c. $(-\infty, -2) \cup (-2, 12) \cup (12, \infty)$
 d. $(-\infty, \frac{3}{2}]$ e. $(-\infty, \infty)$

8 a) $f(-3)=1, f(-2)=0, f(-1)=1, f(2)=1, f(4)=0$ b)
 c) $(-\infty, 0) \cup [2, \infty)$



9. a) 3 b) $\frac{1}{6t+2}$ c) $\frac{1-\sqrt{a+1}}{a\sqrt{a+1}}$

10. a) $y = \sqrt{x+2} + 3$ b) $y = -\sqrt{x} - 3$ c) $y = 3\sqrt{x-1}$ d) $y = -\sqrt{-\frac{1}{3}x}$

11. Boat's speed in still water = 14mph; Current's speed = 6mph

12. 80 boxes of Strawberries; 55 boxes of Kiwi fruit

13. a) $(4, -6)$ b) No solution c) $(3, 7, 4)$

14. a) $y-7=3(x-2)$ or $y+2=3(x+1)$ b) $y = -\frac{3}{4}x + \frac{7}{2}$ c) $x=8$