**MTH130** **Name:** Solution

**Practice Exam 1** **Section:**

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This exam contains 5 pages (including this cover page) and 6 problems. Check to see if any pages are missing. Enter all requested information on the top of this page, and put your initials on the top of every page, in case the pages become separated.

You may *not* use your books, notes, or any calculator on this exam.

You are required to show your work on each problem on this exam. The following rules apply:

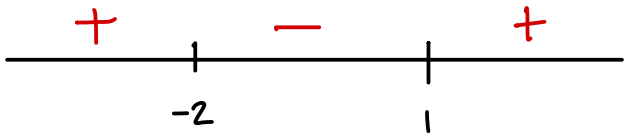
- **Organize your work**, in a reasonably neat and coherent way, in the space provided. Work scattered all over the page without a clear ordering will receive very little credit.
- **Mysterious or unsupported answers will not receive full credit**. A correct answer, unsupported by calculations, explanation, or algebraic work will receive no credit; an incorrect answer supported by substantially correct calculations and explanations might still receive partial credit.
- If you need more space, ask for an extra sheet of paper to continue the problem on; clearly indicate when you have done this.

**Do not write in the table to the right.**

| Problem | Points | Score |
|---|---|---|
| 1 | 6 | |
| 2 | 3 | |
| 3 | 5 | |
| 4 | 2 | |
| 5 | 4 | |
| 6 | 5 | |
| Total: | 25 | |

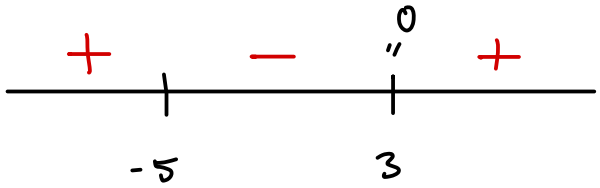
1. (6 points) Solve the following inequalities.

   a) $(x-1)(x+2) > 0$




$(-\infty, -2) \cup (1, \infty)$

   b) $\frac{x-3}{x+5} \leq 0$




$(-5, 3]$

   c) $|x^2+1| \geq 0$.

$(-\infty, \infty)$

This is always non-negative because $|x| \geq 0$ for all $x$.

2. (3 points) Find the equations for the lines given the information below.

   a) The line with a slope of 5 and goes through the point $(2, 0)$.

$y = 5(x-2)$

   b) The line that goes through the points $(2, 1)$ and $(3, 2)$.

$\text{Slope} = \frac{\Delta y}{\Delta x} = \frac{2-1}{3-2} = \frac{1}{1} = 1$

point: $(3,2)$

$y - 2 = 1(x-3)$

$\Rightarrow y = x - 1$

3. (5 points) Consider the following quadratic

$$f(x) = x^2 - 4x + 7$$

a) Put the quadratic function in "standard form".

$b = -4$

$\left(\frac{b}{2}\right)^2 = 4$

$f(x) = x^2 - 4x + 4 + 7 - 4$

$= (x-2)^2 + 3$

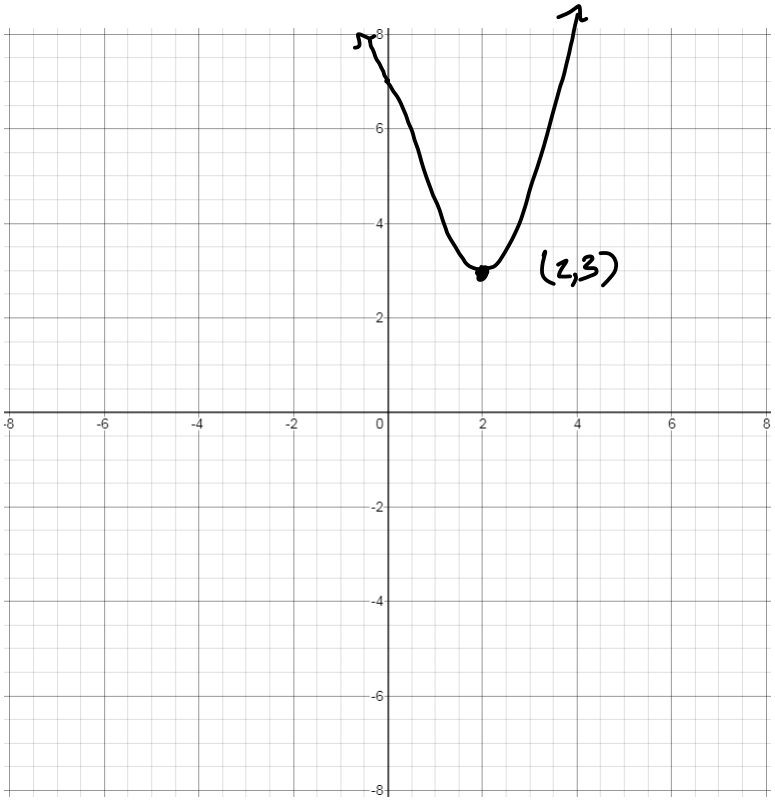
b) Identify the shifts and then graph the quadratic on the axis below.

(a) shift up 3 units.

(b) shift down 0 units.

(c) shift right 2 units.

(d) shift left 0 units.




c) Find all *axis* intercepts.

Graph indicates only a y-axis intercept

Set $x=0$, $f(0) = 0^2 - 4(0) + 7 = 7$. So $(0,7)$ is the y-axis intercept.

4. (2 points) Find the roots of the quadratic equation.

a) $f(x) = x^2 + x - 6$ $= (x+3)(x-2)$ $x = -3$, $x = 2$ are the zeros.

b) $f(x) = 2x^2 - 3x - 2$ $x = \frac{3 \pm \sqrt{9 - 4(2)(-2)}}{2(2)} = \frac{3 \pm \sqrt{25}}{4}$; $x = 2$, $x = -\frac{1}{2}$ are the zeros.

5. (4 points) Consider the following function $f(x) = \sqrt{x}$.

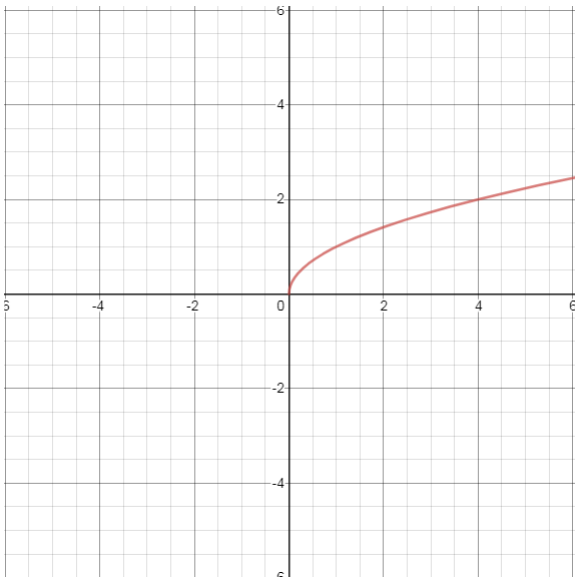
a) Find the domain and range of the function from the graph.

Domain:

$[0, \infty)$

Range:

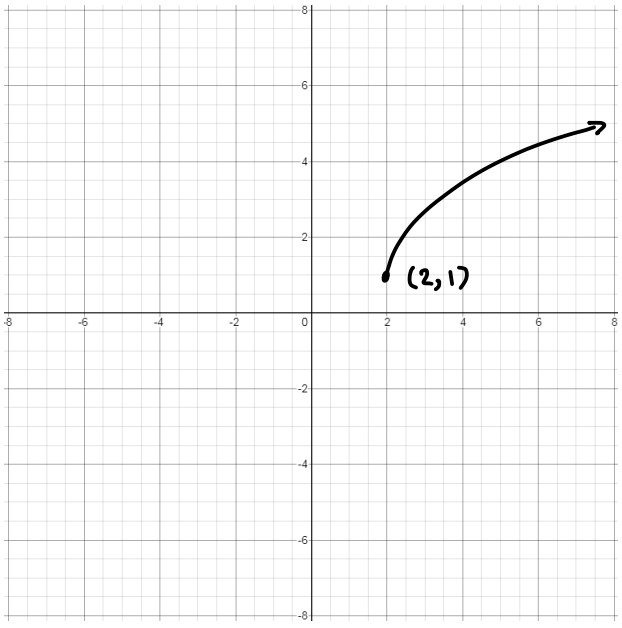
$[0, \infty)$




b) Sketch a graph of $f(x-2)+1$ on the axis below.

shifted right by 2

shifted up by 1

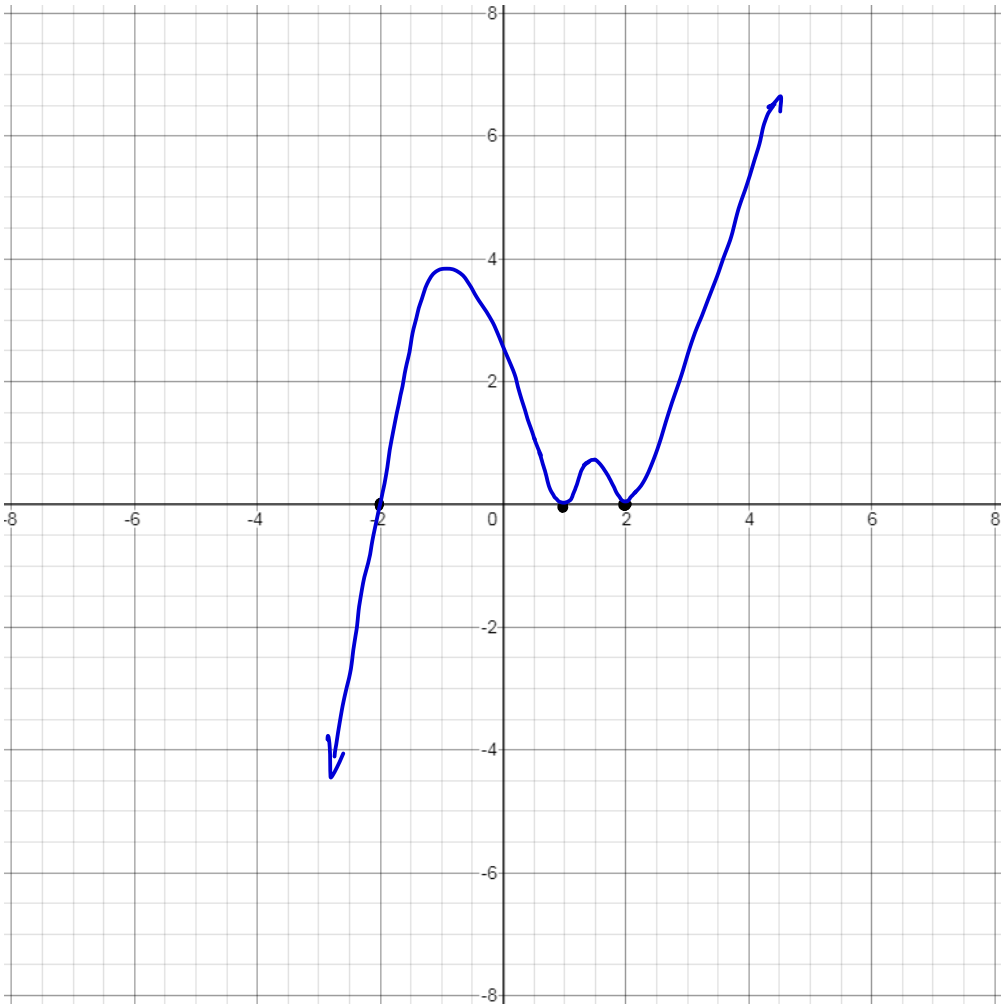


6. (5 points) Sketch a graph of the polynomial on the axis below.

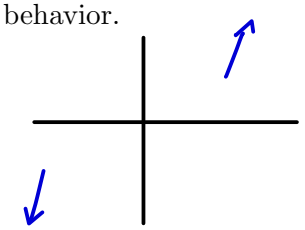
$$f(x) = (x-2)^2(x-1)^4(x+2)$$

Note:
This is a sketch of the graph from the given information.

The graph will be different when graphed on a computer due to scaling




a) Identify the end behavior.



b) Identify the zeros and multiplicities.

| zeros | $x=2$ | $x=1$ | $x=-2$ |
|---|---|---|---|
| mult | 2 | 4 | 1 |

c) Identify where the function is positive and negative.