Math 120 **Midterm II, February 27th, 2020** **Winter 2020**

HONOR STATEMENT
I affirm that my work upholds the highest standards of honesty and academic integrity at the University of Washington, and that I have neither given nor received any unauthorized assistance on this exam.

Name

Signature

Student ID #

Please circle Section

AA AB AC
BA BB BC

	1.	2.	3.	4.	$\sum$
Possible	10	10	15	15	50
Points					

- Please turn off your cell phone and put it away.
- There are 4 problems on 10 pages. Check your copy of the exam for completeness. Note that front **and** back of the pages are printed on.
- You are allowed to use a hand written sheet of paper (8x11 in), back and front.
- The only calculator allowed is Ti-30x IIS
- When applicable, make a labeled sketch of the situation. It will grant you at least 1 point.
- Justify all your answers and show your work for full credit.

Do not open the test until everyone has a copy and the start of the test is announced.

GOOD LUCK!

Problem 1 (10 points) *Consider the quadratic function* $f(x) = 3x^2+9x+2.75$ *with domain* $-\infty \leq x \leq -\frac{3}{2}$.

(a) What is the range of f*?*

(b) Find the inverse function f^{-1} *of* f*.*

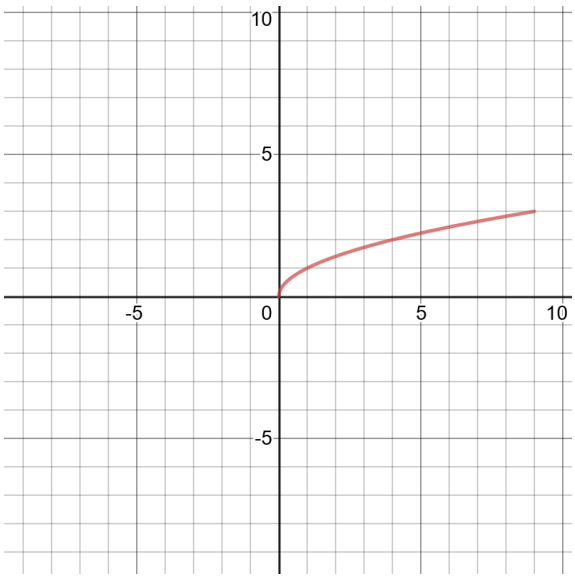
Problem 2 (10 points) *Consider the function* $f(x) = \sqrt{x}$ *on the domain* $0 \leq x \leq 9$. *A graph of* f *looks like Figure 1 on page 4.*
Through shifting, reflecting and dilation this function was altered to $g(x) = -\frac{1}{2}f(-2x+9)$.

(a) Find the domain and the range of $g(x)$.

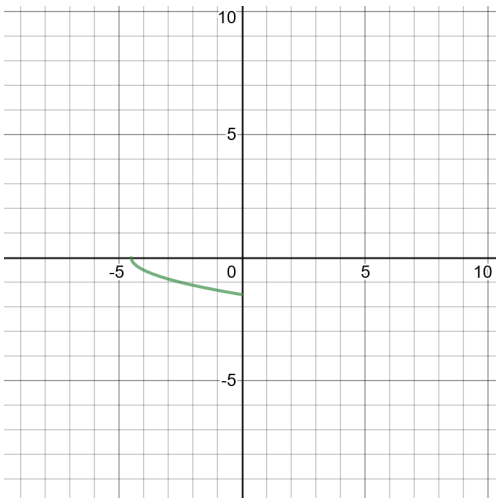
(b) Describe the manipulations to the graph we did. Add details by using 'compressed/stretched by factor....', 'reflected about the ....-axis', 'shifted right/left/up/down by .... units':

HORIZONTAL	*shift:*
	dilation:
	reflection
VERTICAL	*reflection:*
	dilation:
	shift

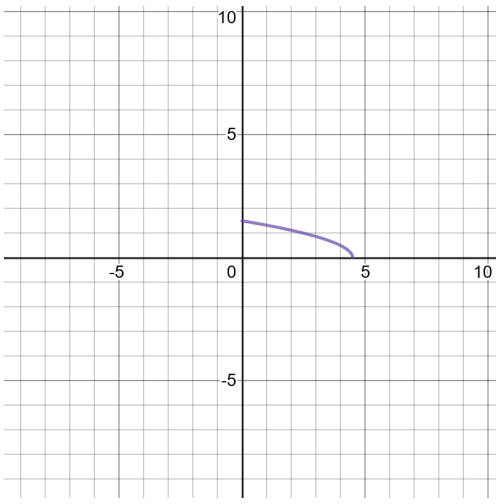
(c) Identify the graph of $g(x)$ *among the those on page 5.*



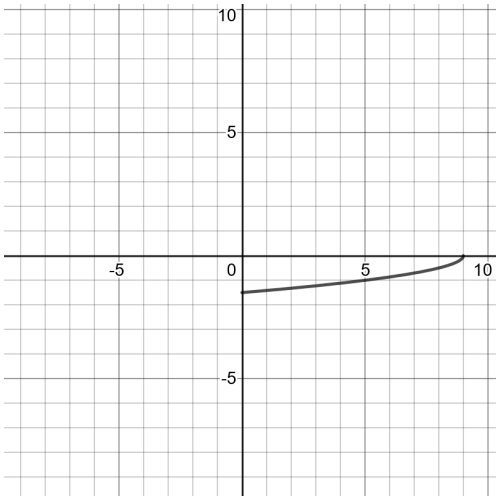
(a) Figure 1



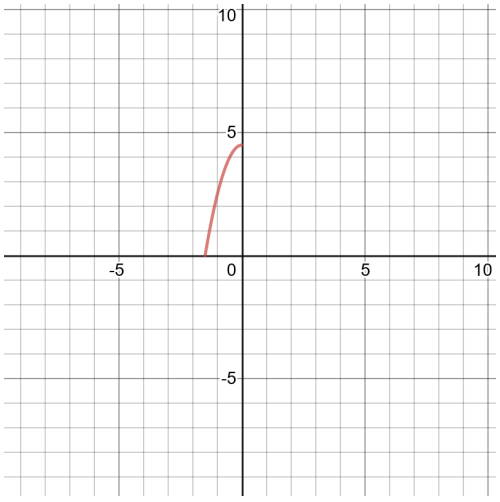
(a) Option a) ☐



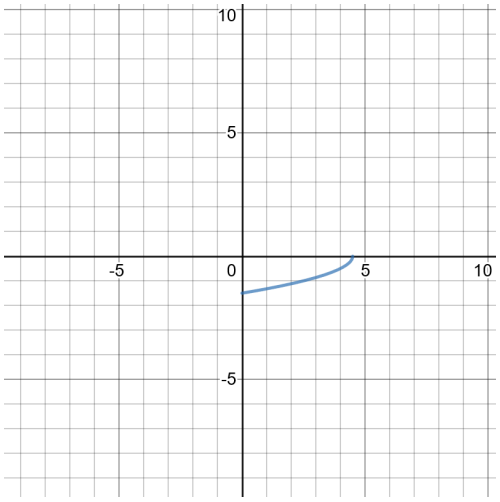
(b) Option b ☐



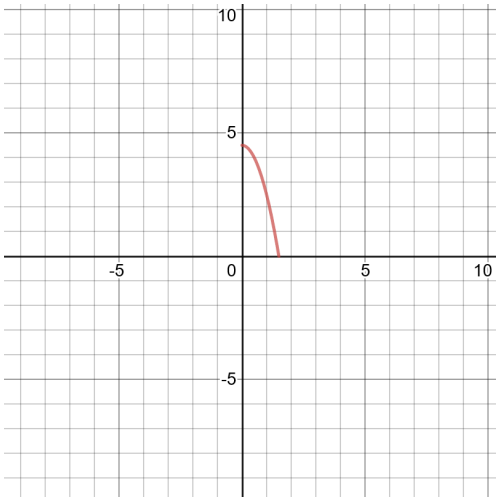
(c) Option c ☐



(d) Option d ☐



(e) Option e ☐



(f) Option f ☐

Problem 3 (15 points) *The population of City A is growing at a constant rate of 2% each year. In the year 2000, this city had 20,000 inhabitants. The population of City B grows exponentially. In 2010, City B had half as many inhabitants as City A at that time. In 2020, City B had 5,000 inhabitants more than City A. In which year did both cities have the same number of inhabitants?*

Problem 4 (15 points) *While downloading the new season of their favorite TV show, Family Smile notices a slow-down of the download speed. It turns out that the downloaded percentage is a linear-to-linear rational function in time, where time t is measured in minutes.*
At first, the download was 0%.
After 30 seconds, the download was at 18%.
After 4 minutes, the download was at 60%.

(a) Where will the download be after 20 long minutes?

(b) Will it ever finish the download? Explain your answer.

Extra Paper