Math 126 - Spring 2020 - Final Exam (Take-Home)
DUE WEDNESDAY, MAY 13, 2020 BY 11:59PM

Name: _____

HONOR CODE: On my honor, I have neither given nor received any aid on this examination that is not explicitly allowed in the instructions.

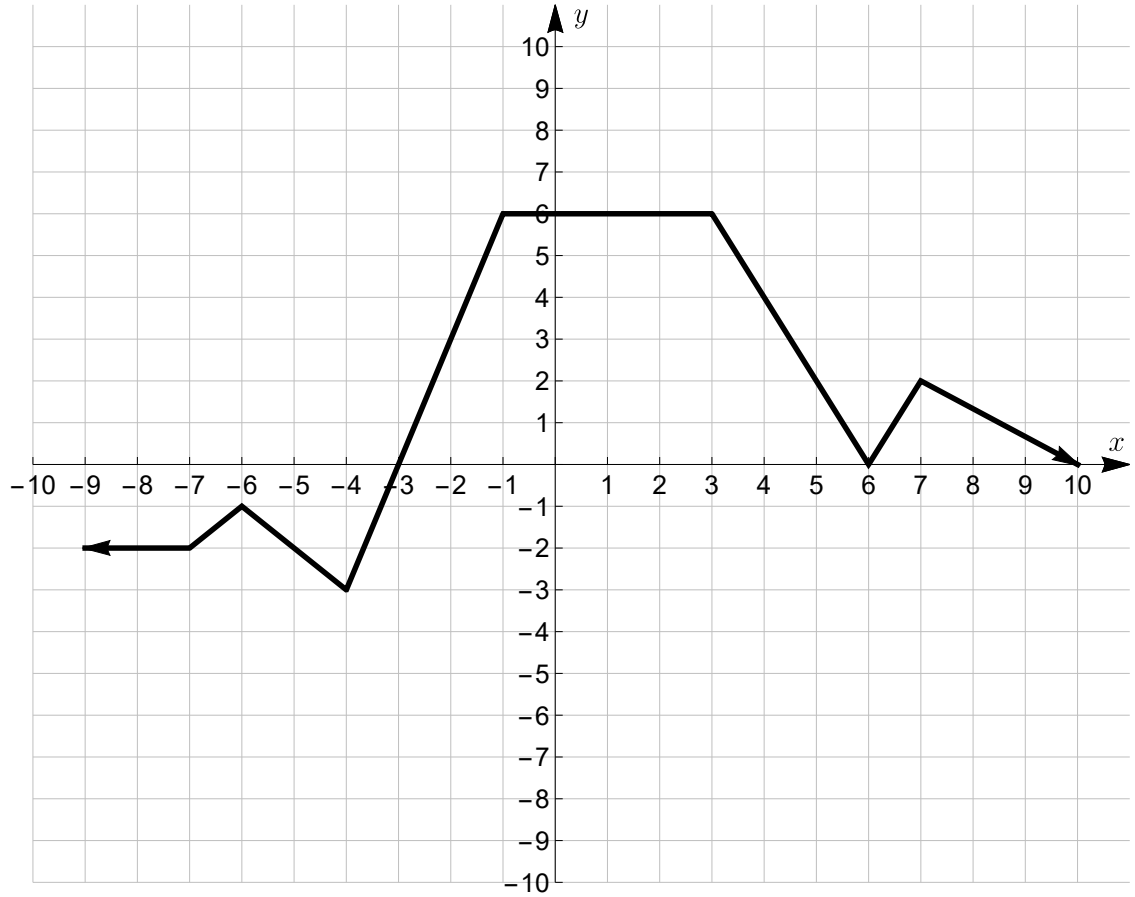
Signature: _____

Instructions: You may review the lecture videos and use your notes, the lecture notes, the textbook, the ALEKS homework, and your calculator when working on this exam. **You may <u>not</u> receive help from anyone else, give help to anyone else, discuss any aspect of the exam or any items related to the exam with anyone else, or use any resources not specified in the previous sentence.** You may submit your answers and scratch work either on a printed copy of this exam or on your own paper. If you use your own paper, you do **not** need to copy the question; just be sure you clearly label which question the scratch work and answer belong to. If I can't tell with certainty which question any scratch work or answer belongs to, you will not receive credit for that work or answer. If you use your own paper, you **DO** need to copy the honor code above and sign it. To submit your scratch work and answers, you can either scan your work (if you have access to a scanner) or take pictures with your cell phone, then email me your scans or pictures. Be sure the writing in your scans or pictures is dark enough and clear enough that I can easily read what you've written. If I can't read what you've written, I can't give you credit for it. Make sure your final answers are clearly labeled. **SHOW ALL WORK ON THIS EXAM IN ORDER TO RECEIVE FULL CREDIT!!!** There are extra blank graphs at the end of the test, in case you need them. If you do use the extra blank graphs at the end of the test, be sure to (1) indicate on the question that you have more work on the extra blank graphs and (2) label your work on the extra blank graphs so I know what work goes with which question.

No.	Score
1	/8
2	/6
3	/6
4	/6
5	/8
6	/8
7	/12

No.	Score
8	/12
9	/8
10	/6
11	/6
12	/14
Total	/100

1. Use the following graph to answer parts (a) - (c).



(a) Find the values of $f(-6)$, $f(-2)$, and $f(2)$. (3 points)

(b) State the intervals on which the function is increasing, decreasing, and constant. (3 points)

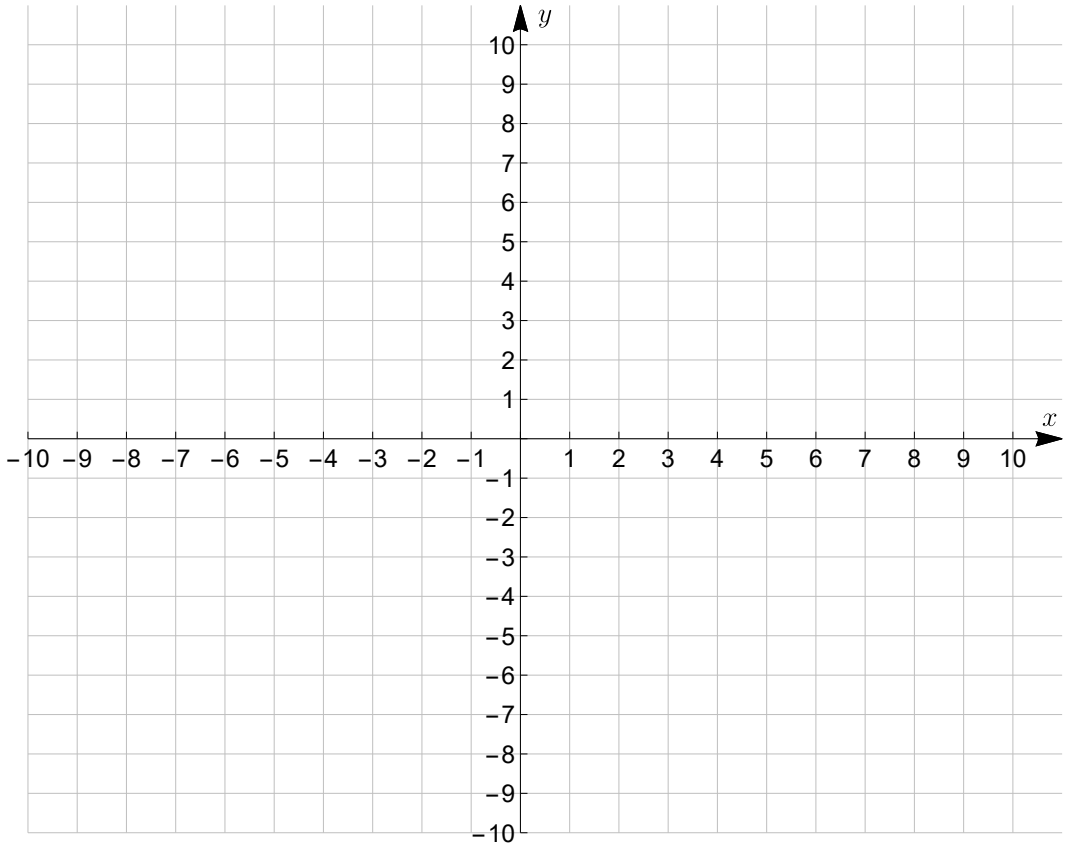
(c) Determine where the local maxima and minima occur and determine what the local maximum and local minimum values are. (2 points)

2. Use the following function to answer parts (a) and (b).

$$f(x) = \left(\frac{1}{3}x\right)^3 + 1$$

(a) State which transformations have been applied, and in which order they have been applied, to the function $g(x) = x^3$ to get the function $f(x)$ given above. **Explain how you know.** (2 points)

(b) Graph the function $f(x)$ given above. (4 points)



3. Use the following function to answer parts (a) - (d).

$$f(x) = -x^2 + 4x - 3$$

(a) Find $f(-4)$. (1 point)

(b) Find $f(2)$. (1 point)

(c) Find $f(x + h)$. (2 points)

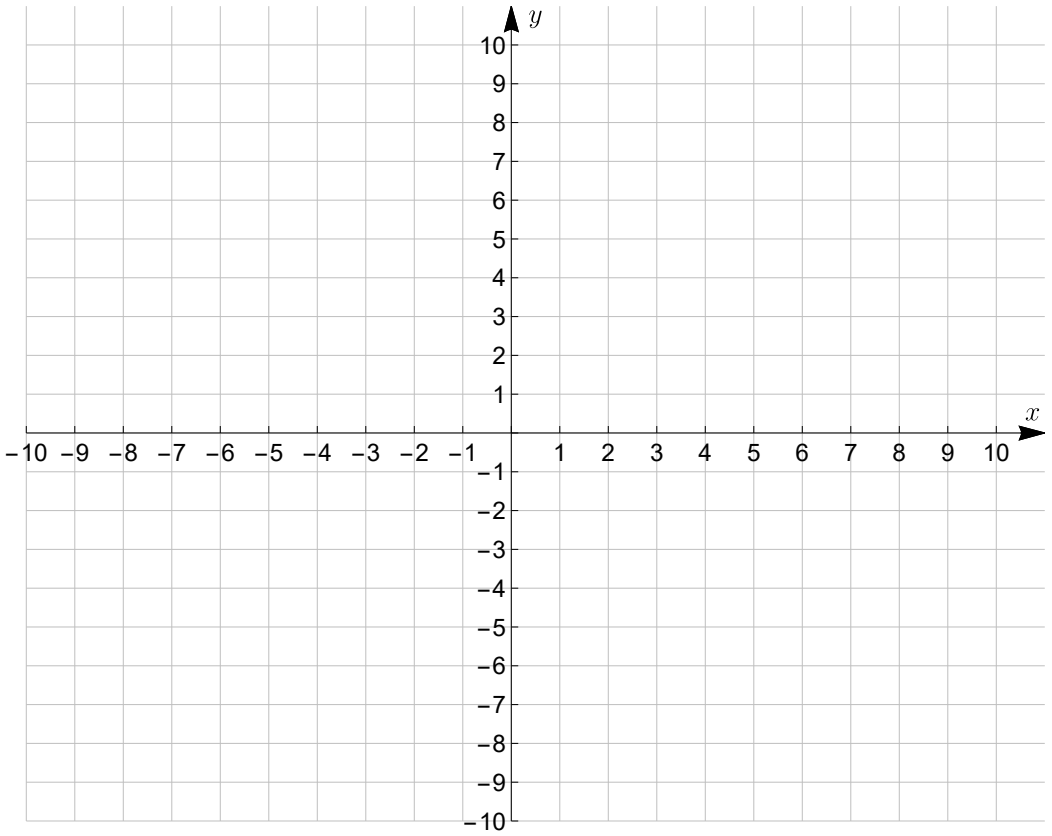
(d) Find the average rate of change of f from $x = -4$ to $x = 2$. (2 points)

4. Find the equation of the line, in slope-intercept form, passing through the following points. (6 points)

$$(4, -3) \text{ and } (-4, 1)$$

5. Graph the following function. (8 points)

$$f(x) = \frac{1}{16}(x+2)^4(x-1)^3(x-3)^2$$



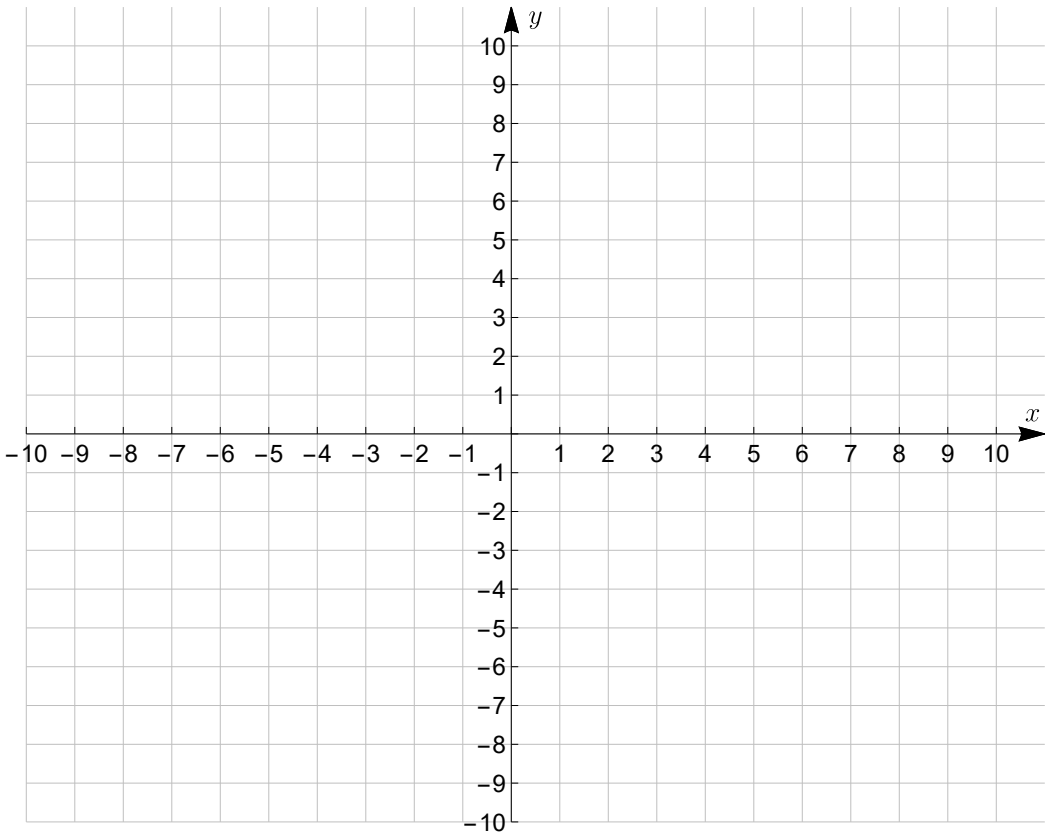
6. Find all the roots of the following polynomial function and write the function in factored form. (8 points)

$$f(x) = 2x^4 - 7x^3 - 10x^2 + 33x + 18$$

6. (continued)

7. Graph the following function. (12 points)

$$f(x) = \frac{6x^2 - 24x + 24}{x^3 + x^2 - 8x - 12} = \frac{6(x-2)^2}{(x+2)^2(x-3)}$$



7. (continued)

8. Solve each of the following inequalities. (4 points each)

(a) $4x^2 - 15x + 7 < -2$

(b) $(x+3)(x+1)^2(x-2)^4 \geq 0$

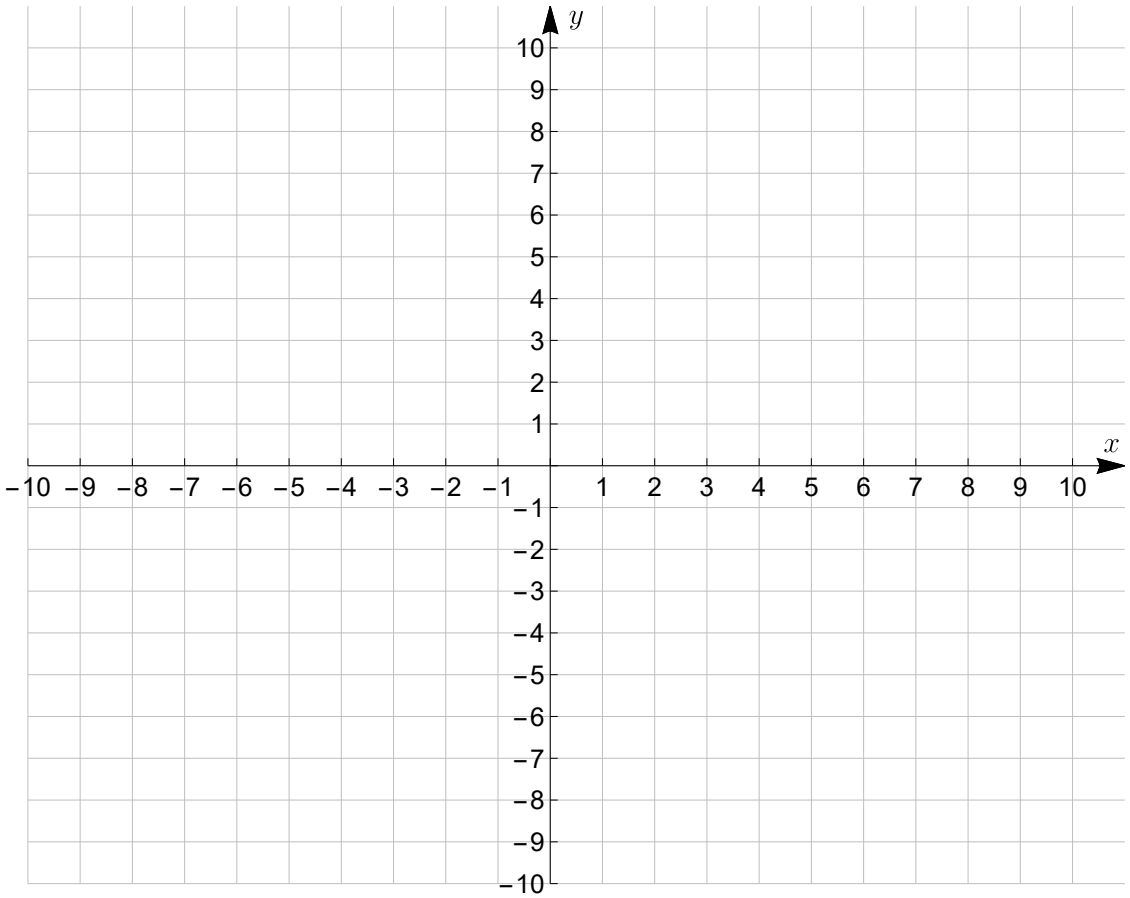
(c) $\frac{x(x-5)^3}{(x+2)^2} \geq 0$

9. Find the inverse of f. State the domain and range of both f and f^{-1}. (8 points)

$$f(x) = \frac{x+3}{2x}$$

10. Graph the following function. (6 points)

$$f(x) = -\left(\frac{3}{4}\right)^{x-2}$$



11. (a) Write as a sum/difference of logarithms. Express exponents as factors. Simplify as much as possible. (3 points)

$$\log_2\left((x+6)^3(8x-24)\right)$$

(b) Write as a single logarithm. Simplify as much as possible. (3 points)

$$\log_5\left(x^2yz^3\right) - 4\log_5\left(xz\right) + \log_5\left(xy^3\right)$$

12. Solve each equation. For non-integer answers, write your answer in exact form and then express your answer as a decimal rounded to two decimal places.

(a) $16^{x+5} = \left(\frac{1}{64}\right)^{x}$ (3 points)

(b) $4\log_4(3x-5) = 8$ (3 points)

(c) $10^{5x-1} = 20$ (3 points)

(d) $\log_7(x^2 - 2x - 8) - \log_7(-x - 2) = 1$ (5 points)

Extra Blank Graphs.