Math 124E - Summer 2020 - Final Exam
DUE THURSDAY, JULY 23, 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 videos in MyMathLab or the course website, use the e-book, the MyMathLab homework and quizzes, 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!!!**

No.	Score
1	/20
2	/4
3	/8
4	/4
5	/4
6	/6
7	/6
8	/5

No.	Score
9	/8
10	/14
11	/6
12	/6
13	/3
14	/6
Total	/100

1. Solve each of the following equations. (4 points each)

(a) $\dfrac{3}{4x+12} + \dfrac{1}{4} = \dfrac{2}{x+3}$

(b) $\sqrt{-9x+28} + 4 = x$

(c) $3(x+4)^2 = 60$

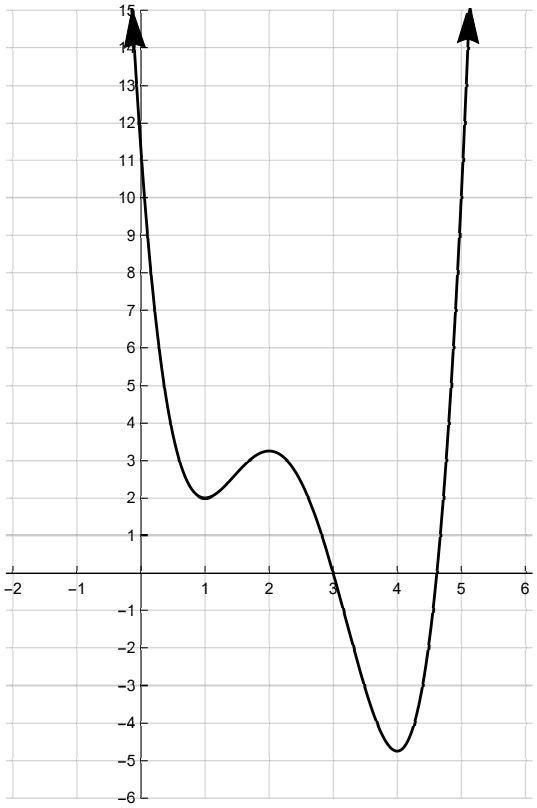
(d) $3x^2 + 6x = 1$

(e) $9x^3 + 16 = 36x^2 + 4x$

2. Without graphing, determine whether the function is even, odd or neither. Then determine whether the function's graph is symmetric with respect to the x-axis, y-axis, the origin, or none of these. **Explain your answer!** (4 points)

$$y = \frac{x^3 + x}{x^2 - 1}$$

3. Use the graph to find the following.



(a) The intervals on which f is increasing. (2 points)

(b) The intervals on which f is decreasing. (2 points)

(c) The number at which f has a relative maximum. (1 points)

(d) The left-most relative mimimum of f. (1 points)

(e) $f(3)$ (1 points)

(f) The largest value of x for which $f(x) = 10$. (1 points)

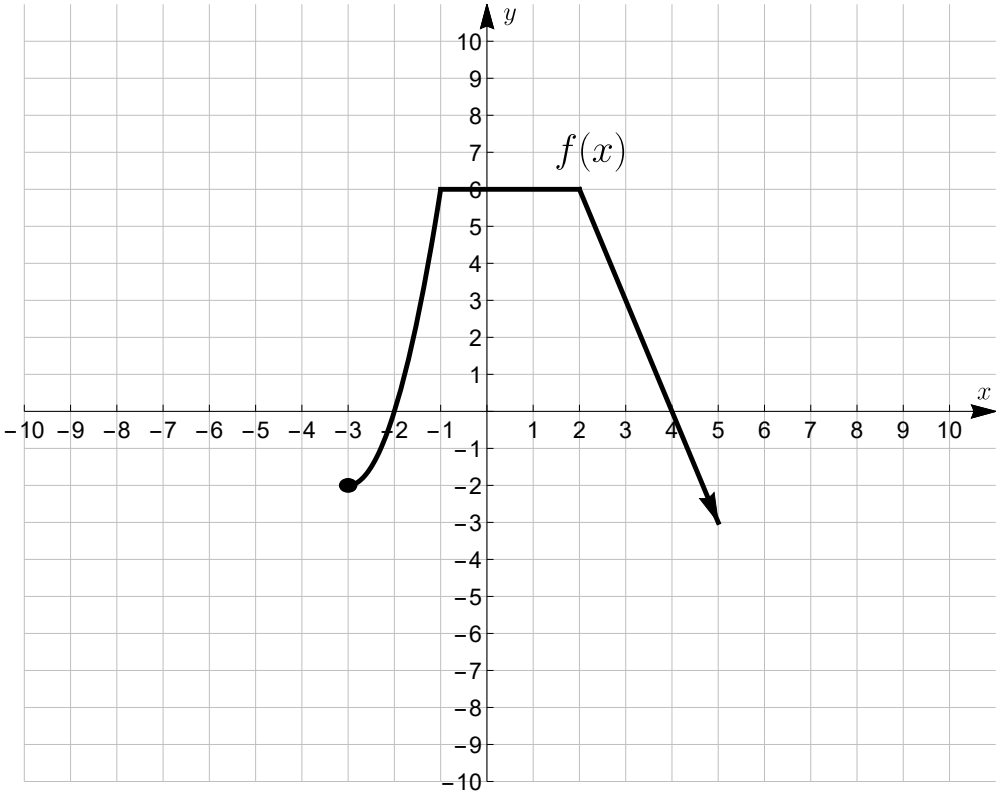
4. Find an simplify the difference quotient $\dfrac{f(x+h)-f(x)}{h}$, $h \neq 0$ for the given function. (4 points)

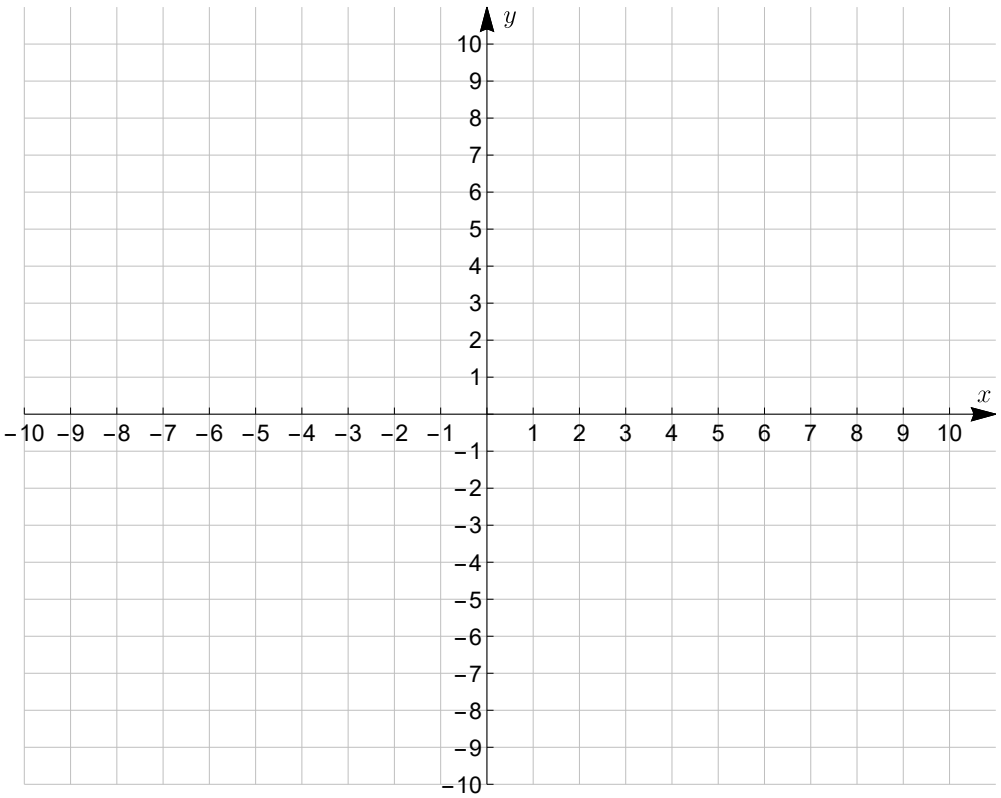
$$f(x) = 4x^2 + 2x$$

5. Use the given conditions to write an equation for the line in slope-intercept form. (4 points)

Passing through $(7, -6)$ and $(5, 2)$

6. Use the graph of $y = f(x)$ to graph the function $g(x) = f\left(-\frac{1}{2}x\right) + 3$. (6 points each)





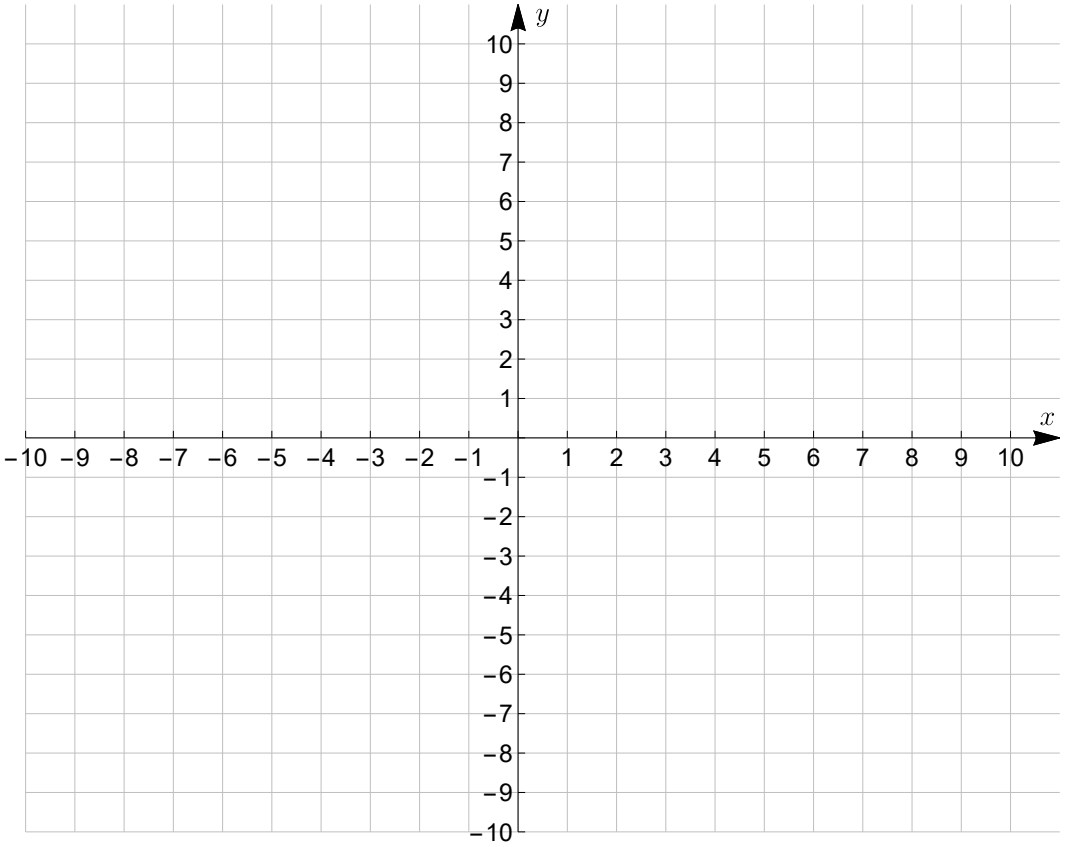
7. For $f(x) = 2x - 5$ and $g(x) = x^2 + x - 4$, find the following functions. (3 points each)

   (a) $(f \circ g)(x)$

   (b) $(g \circ f)(-1)$

8. Use transformations of the graph of $f(x) = e^x$ to graph the given function. (5 points)

$$f(x) = e^{x-4} + 5$$



9. (a) Write as a sum/difference of logarithms. Express exponents as factors. Simplify as much as possible. (4 points)

$$\log_5 \left(\frac{w^3 y^5}{x^2 z} \right)$$

(b) Write as a single logarithm. Simplify as much as possible. (4 points)

$$4 \log_2 x - \log_2 (x + 4) - \log_2 (3x - 1)$$

10. (a) Solve the following equation. Provide the exact value. (4 points)

$$4^{2x-3} = \frac{1}{8}$$

(b) Solve the following equation. Provide the exact value and a decimal approximation rounded to two decimal places. (5 points)

$$3^{4x+5} = 6$$

(c) Solve the following equation. Provide the exact value and a decimal approximation rounded to two decimal places. (5 points)

$$3\ln(2x+1) - 7 = -10$$

11. A bird species in danger of extinction has a population that is decreasing exponentially $\left(A = A_0 e^{kt}\right)$. Six years ago the population was at 1800 and today only 1000 of the birds are alive. Once the population drops below 200, the situation will be irreversible. When will this happen? (6 points)

12. Solve the following system of equations by either the method of addition or the method of substitution. (6 points)

$$\begin{aligned} 3x + 4y + 2z &= -1 \\ x + y + z &= 0 \\ x + 2y - 3z &= 5 \end{aligned}$$

13. Perform the indicated sum. (3 points)

$$\sum_{i=2}^{5} \left(3i^2 - 5\right)$$

14. Use the appropriate sum formula to find the indicated sum. (3 points each)

(a) Find $3 + 7 + 11 + 15 + \cdots + 299$, a sum which has 75 terms..

(b) Find $3 + 6 + 12 + \cdots + 1536$, a sum which has 10 terms.