

You may use a calculator for this part of the exam. Each numbered exercise is worth six points, unless stated otherwise.

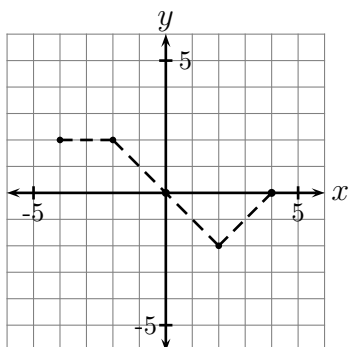
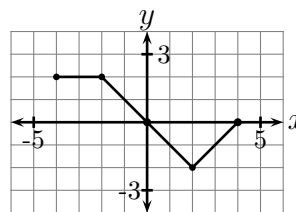
1. For $f(x) = 3x - x^2$ and $g(x) = x + 2$, find and simplify $(f \circ g)(x)$. Show all work and label your answer clearly with what it is.

2. Give the inverse of each function in the space below it. Make your answer clear, with correct notation.

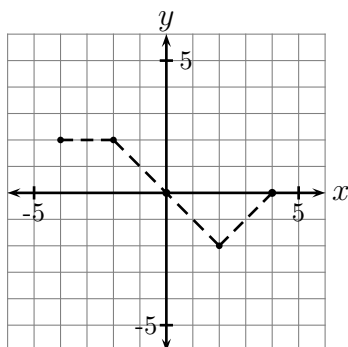
(a) $g(x) = \frac{x+1}{5}$

(b) $h(x) = \sqrt[5]{x-3} + 2$

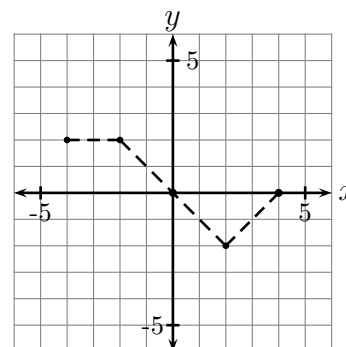
3. The graph to the right is for a function $y = f(x)$; the same function is shown again, dashed, on each grid below. On each grid, sketch the graph of the function described below the grid.



$y = 2f(x)$



$y = f(x - 1)$



$y = f(-x) + 3$

4. For each of the following, show the equation used, with values substituted in, and your answer.

(a) You put \$500 in a savings account at an annual interest rate of 3.75%, compounded weekly. How much will you have after 3 years?

(b) The total weight $W(t)$, in milligrams, of a soybean plant after t days is given by $W(t) = 68e^{0.2t}$. How much will a soybean plant weigh after 5 days? **Round your answer to the nearest whole milligram.**

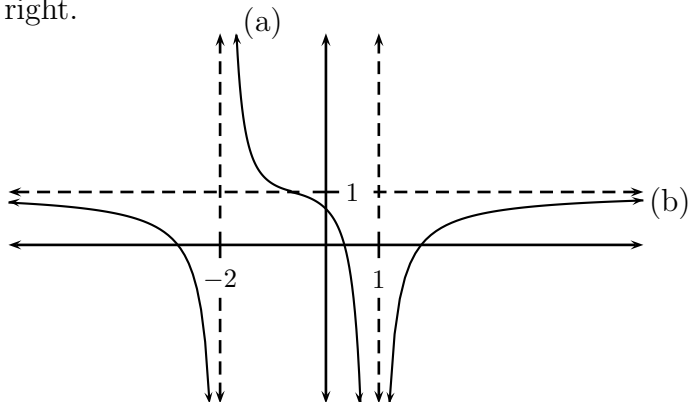
Do **EXACTLY THREE** of the remaining exercises. **Circle the numbers of the ones you want me to grade.**

5. Solve the inequality $-3(x + 5)(x - 2)(x + 1) \geq 0$. **Give your answer using interval notation. Show some work if you would like the chance for partial credit for an incorrect answer.**

6. Fill in the blanks to describe the behaviors of the tails labeled (a) and (b) for the function whose graph is shown below and to the right.

(a) As $x \rightarrow$ _____, $y \rightarrow$ _____

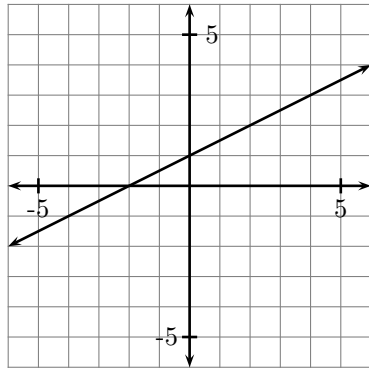
(b) As $x \rightarrow$ _____, $y \rightarrow$ _____



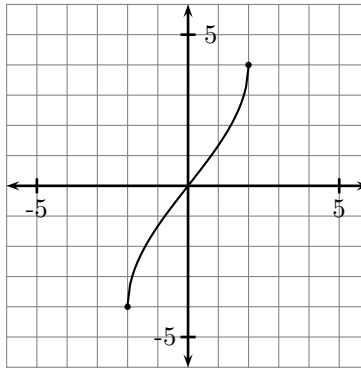
7. Let $f(x) = \frac{2x}{x-4}$ and $g(x) = \frac{x}{x+5}$. find **and simplify** the function $(f-g)(x)$, denoting it with the correct notation.

8. **Without finding the inverse of either**, determine whether the functions $f(x) = \frac{2}{3}x+2$ and $g(x) = \frac{3}{2}x-3$ are inverses. **Show clearly how you do this.**

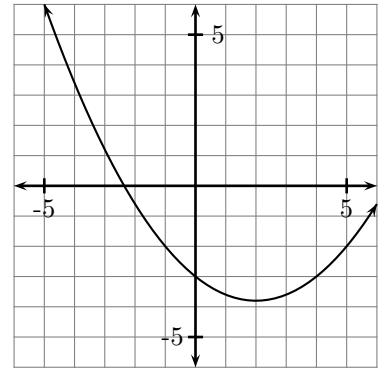
9. For each of the following, circle either the entire phrase “not one-to-one” or just the words “one-to-one” for the graph given. Then, if the function is one-to-one, draw the graph of the inverse function on the same grid.



not one-to-one



not one-to-one



not one-to-one

10. (a) Fill in the blanks: The half life of a medication is 2.5 hours. If you take 120mg, there will be 10mg left in your body between _____ and _____ hours later.

- (b) The doubling time for a population of fish in a lake is 3 years. If there are currently 3200 fish in the lake, how many were there 12 years ago?