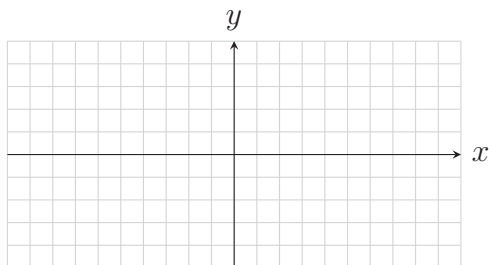
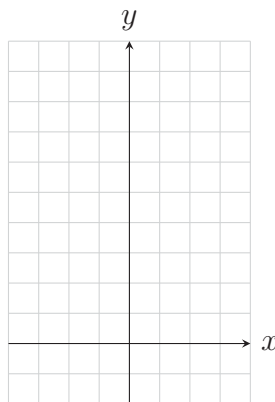


□ 1. Sketch the following functions from memory. Include key points/asymptotes.

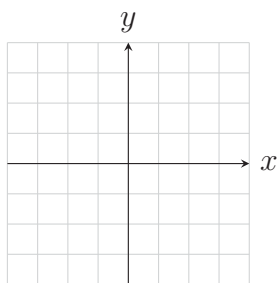
a. Graph $f(x) = \sqrt[3]{x}$



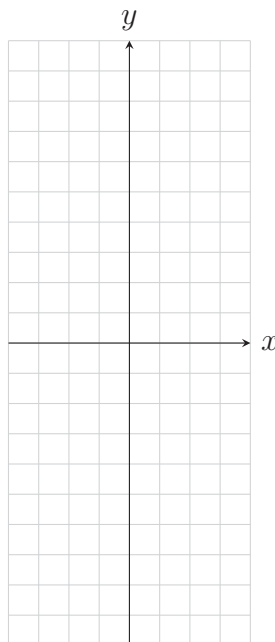
d. Graph $f(x) = x^2$.



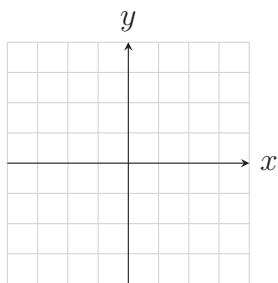
b. Graph $f(x) = b$.



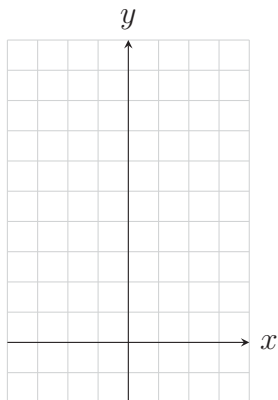
e. Graph $f(x) = x^3$.



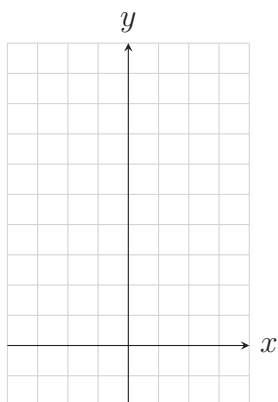
c. Graph $f(x) = x$.



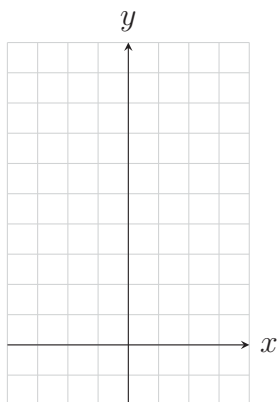
f. Graph $f(x) = 2^x$.



g. Graph $f(x) = \left(\frac{1}{2}\right)^x$.



h. Graph $f(x) = e^x$.



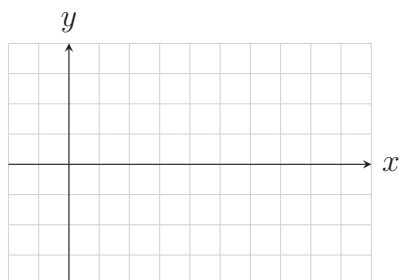
i. Graph $f(x) = \log_2(x)$.



j. Graph $f(x) = \log_{1/2}(x)$.



k. Graph $f(x) = \ln(x)$.



Name: _____

- 1. Let f and g be two functions defined as

$$f(x) = \frac{2}{x+1} \quad \text{and} \quad g(x) = \frac{x}{x-1}.$$

Find the following and find the domain in each case.

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

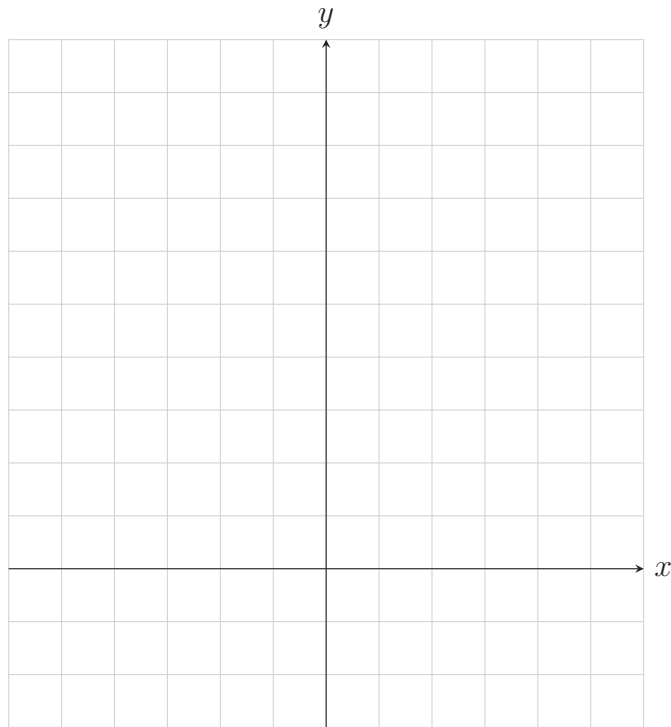
b. $\left(\frac{f}{g}\right)(x)$

2. Find functions f and g such that $(f \circ g)(x) = 3\sqrt{2x-5}$. In fact find at least 3 non-trivial solutions along with the two trivial solutions.

3. A function f defined as

$$f(x) = \begin{cases} -2(x + 4)^2 + 3 & \text{if } x < -3 \\ 1 & \text{if } -3 \leq x < -1 \\ 2x - 1 & \text{if } x > 1 \end{cases}$$

□ a. Graph $y = f(x)$.



b. Find $f(-4)$, $f(-2)$, $f(1)$, and $f(2)$.

d. Determine the domain and range of f .

c. Locate any intercepts.

e. Is f continuous on its domain?

[] 4. Evaluate the following expressions.

a. $\log_a(1)$

c. $e^{\ln(2) \cdot 4t}$

b. $\ln e^{0.45t}$

d. $\log_4\left(\frac{1}{64}\right)$

[] 5. Find $f^{-1}(t)$ when $f(t) = 2 \log\left(\frac{t}{2}\right) - 1$. State the domain and range of both.

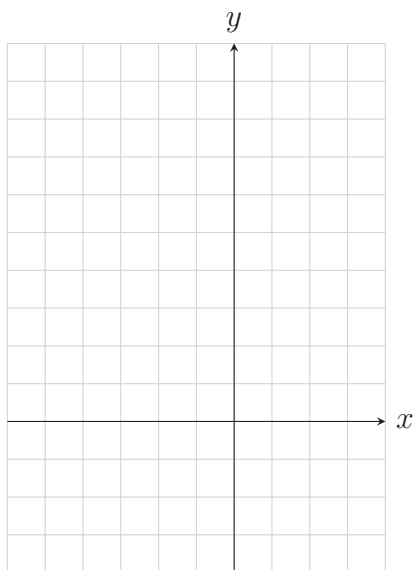
[] 6. Solve the following equations involving exponentials or logarithms.

a. $\ln(x - 2) = \ln(x + 10) - \ln(x)$

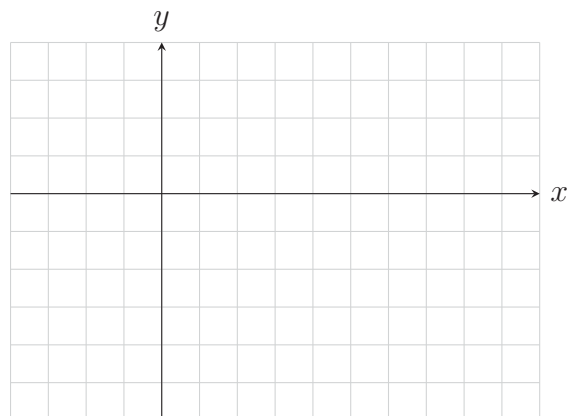
b. $2^{3x-1} = 3^{x+2}$

□ 7. Consider the function $f(x) = 2^{x+1} - 3$ and its inverse $f^{-1}(x) = \log_2(x + 3) - 1$.

(a) Graph $y = f(x)$ using *transformations* of $\exp_2(x) = 2^x$.

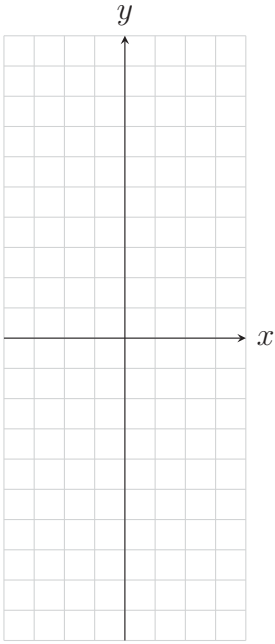


(b) Graph $y = f^{-1}(x)$ using either transformations of $l(x) = \log_2(x)$ or by inversion of f .

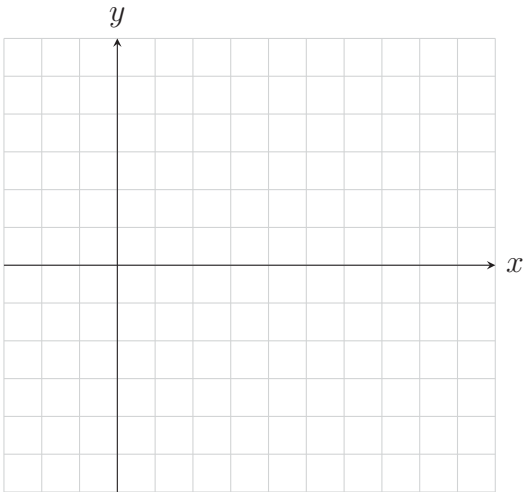


□ (c) State the domain and range of both f and f^{-1} .

8. Graph $f(x) = \frac{1}{2}(x - 1)^3 + 2$ using transformations.

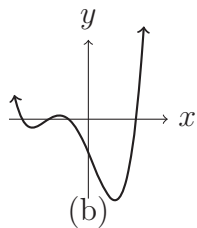
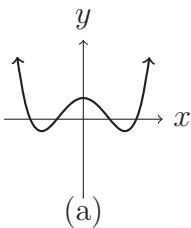


9. Use transformations to graph $g(x) = 2\sqrt{2x + 3} - 4$.

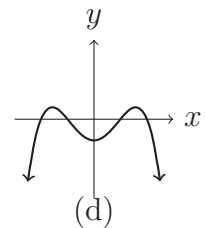
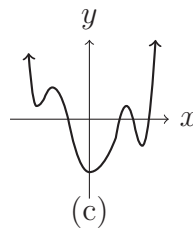


10. Which of the graphs below could be the graph of

$$f(x) = x^4 + 5x^3 + 5x^2 - 5x - 6?$$



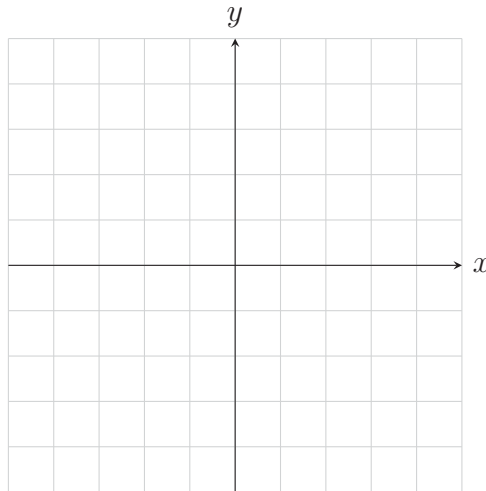
7



11. Given the polynomial $f(x) = (2x + 1)(x - 3)^2$, complete the following.

- a. What is the degree of the polynomial?
What basic function does it most resemble?
- b. How many turning points, at most, does f have?
- c. What are the zeros of f and the multiplicity of each?
- d. What are the x - and y -intercepts of f ?

e. Graph f using the above information and by finding any additional points, if necessary, to draw a nice smooth curve.



f. Use your calculator to determine the turning points of f .

12. Given the graph shown below in Figure 1, answer the following questions.

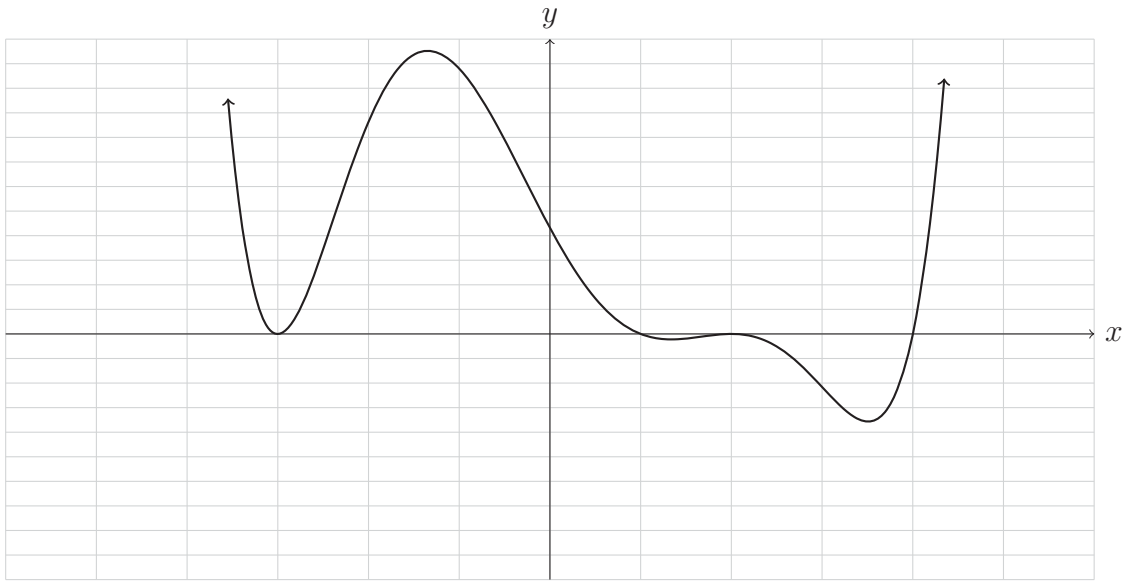
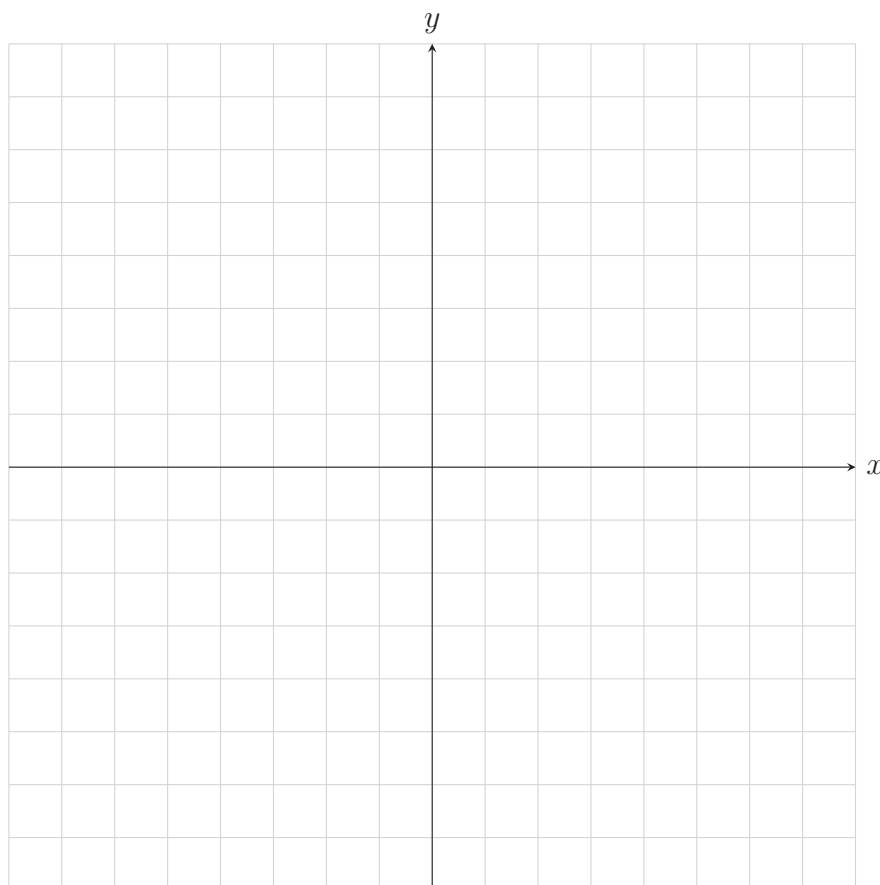


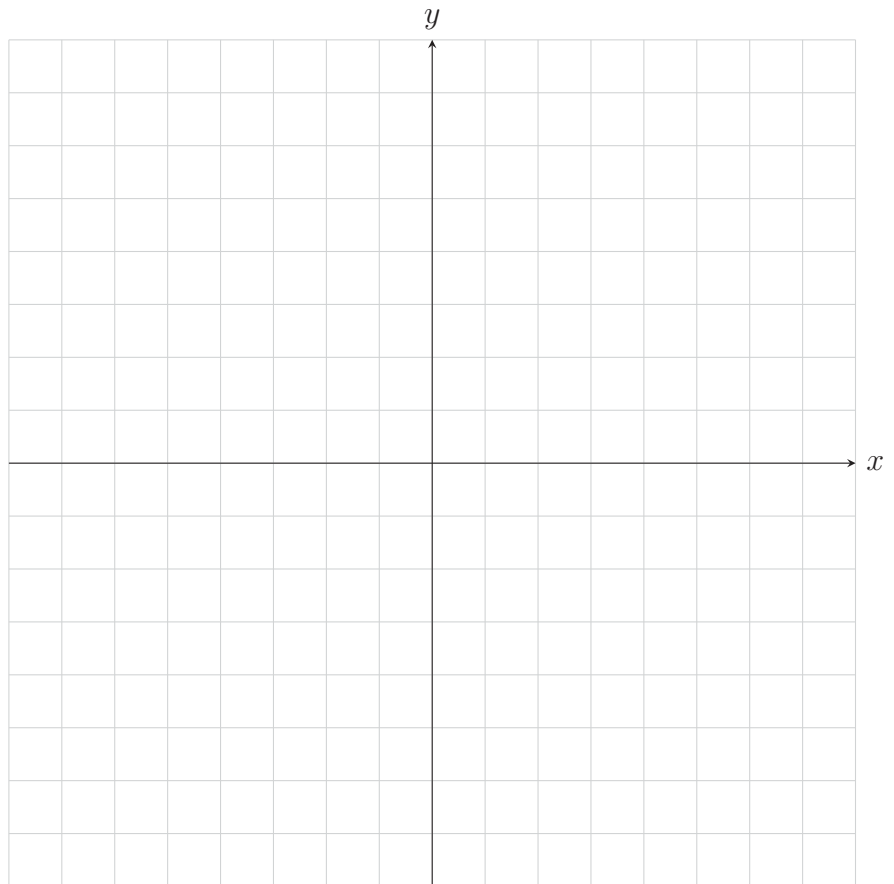
Figure 1: $y = f(x)$

- a. What are the zeros of f and what is the multiplicity of each?
- b. How many turning points are there? What degree polynomial is this most likely?
- c. Where is f positive and where is it negative?
- d. Where is f increasing and where is it decreasing?
- e. What and where are the local mins and maxs?
- f. Is there an absolute max or min? If so what and where?
- g. Where is f concave up and where is it concave down?
- h. What is the symbolic representation of the function f ?

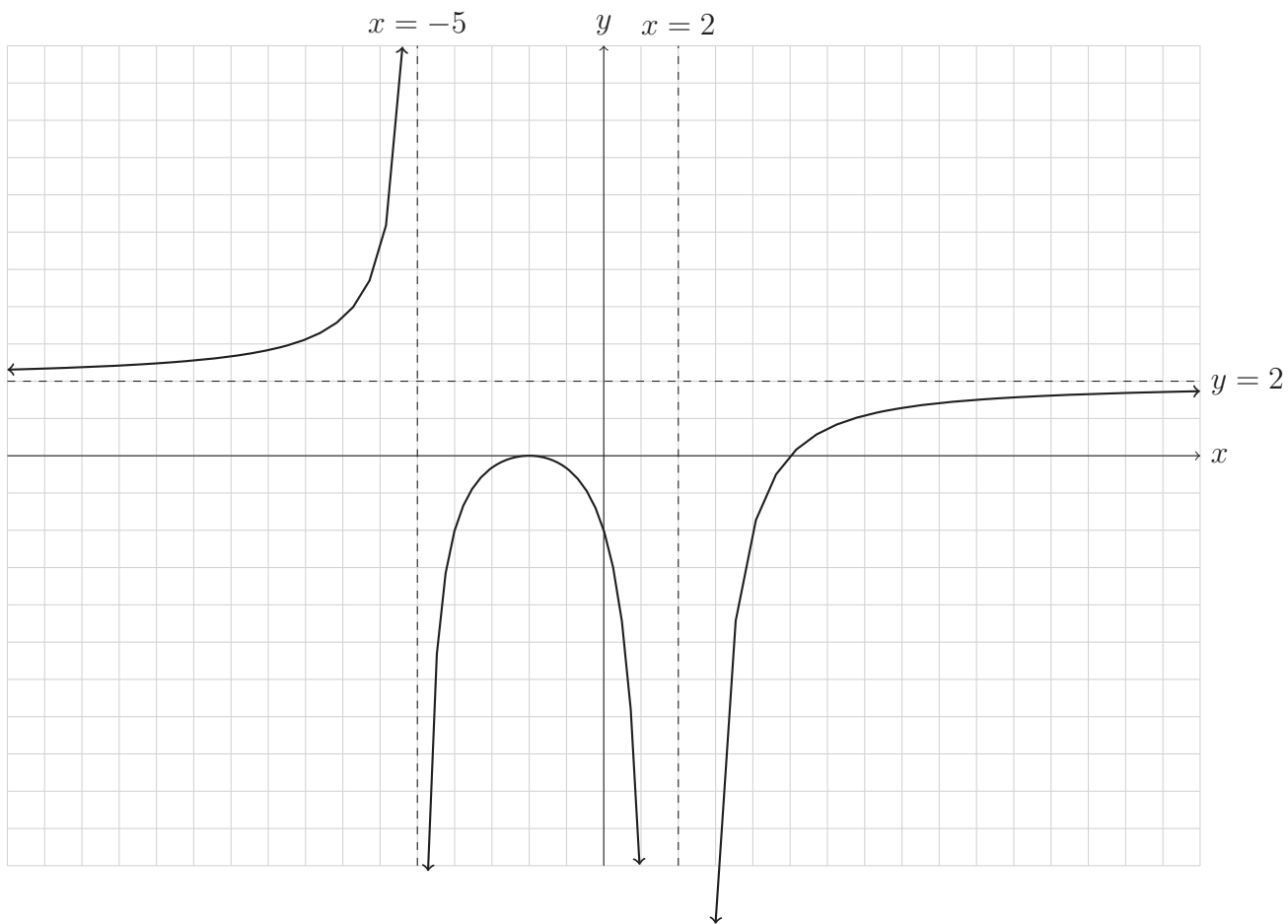
13. For the function $f(x) = \frac{x+2}{x^2-5x-6}$ determine the domain, any vertical asymptotes and any horizontal or oblique asymptotes. Sketch a graph of the function.



14. Analyze and then graph the rational function $R(x) = \frac{2x^2 - 5x + 2}{x^2 - 4}$.



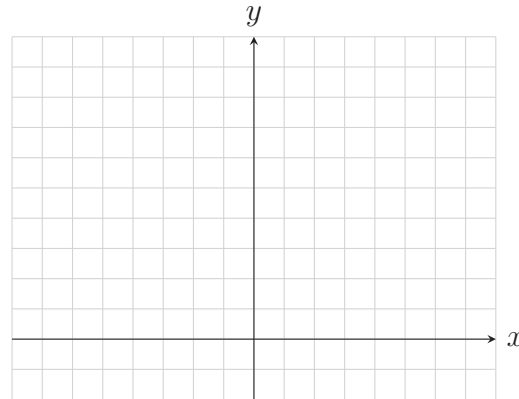
15. Find a rational function that might have the following graph.



Name: _____

- 1. Solve the following equations by graphing. You may use your calculator on these problems.
 [Hint: Make your y-scale 2 or 3]

$$e^x = \sqrt[3]{-x}$$



- 2. Suppose that you want to open a money market account. You visit three banks to determine their money market rates. Bank A offers you 5% annual interest compounded monthly and Bank B offers you 4.98% compounded continuously. Determine which bank is offering the best deal. Explain your answer.
- 3. Suppose you would like to end up with \$10,000 on an investment which earns an annual rate of 2.7% interest compounded continuously. How much would you need to invest up front to make this amount in 10 years?

4. In 1760 the industrial revolution began and the world population was around 0.77 billion people (770 million). Supposing the population began to grow at a continuous rate of 1.01% (time in years), answer the following questions.

- a. Determine a function which models the world population t years after
- d. What is the doubling time for the population?

b. What is the effective 1-year factor of growth and rate of growth?

c. According to the model, when did the population reach 3 billion people?

e. What does this model predict the population will be in 2015?

- 5. The authenticity of the Shroud of Turin has long been debated. In 1988, scientists received permission to remove small samples for carbon dating. Three different laboratories in Arizona, U.S.; Oxford, England; and Zurich, Switzerland analyzed the samples. All three laboratories came to the same conclusion: The shroud had lost about 8% of its carbon-14 atoms to radioactive decay. Given this result, what was the approximate date of the origin of the Shroud of Turin remembering that the half life of carbon-14 is about 5600 years. Round to the nearest 100 years. (Note: Despite these and other scientific investigations, the origin and date of the Shroud of Turin remains a subject of controversy.)