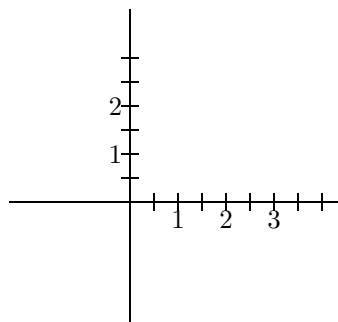
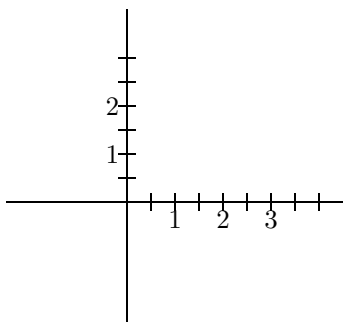
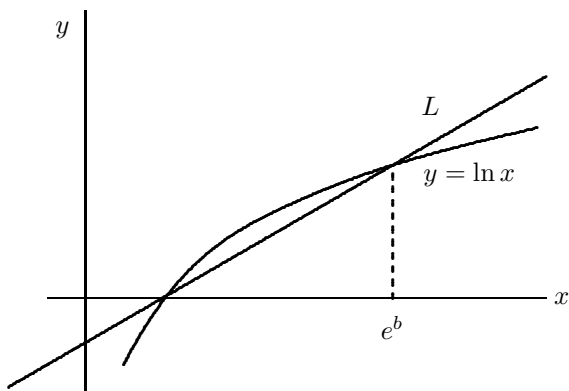


- a) Sketch a graph of  $f$   
b) Sketch a graph of the inverse function  $f^{-1}$



- c) Find an equation for  $f^{-1}$ .  
d) Use the definition of inverse function to verify that your answer to (c) is correct.



5. (15) In the center column of the table is given the population of a small country over a ten year period. During this same period, the farmers of the country have produced more than enough food to support the population. The right column of the table gives the number of people that this country's agriculture can support during this same period.

year	Population	No. of people farmers can feed
1985	100,004	105,000
1987	108,104	115,650
1989	116,860	125,253
1991	126,326	134,847
1993	136,559	145,506
1995	147,620	155,100

a) Using one exponential function and one linear function, write equations that model this data. (The data is neither perfectly linear nor perfectly exponential.)

Population:

No. fed:

b) Using the equations from (a), how long will there be enough food for this population? Tell how you arrive at your answer.

6. (20) Let  $f(x) = \frac{3}{2-x}$ . Find

a) (simplify)  $f(x+1)$

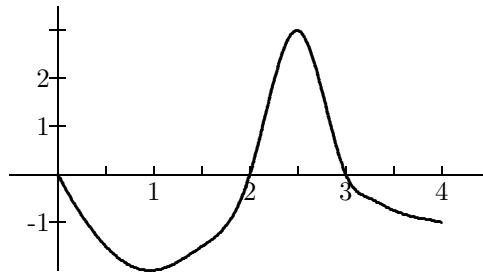
b) (simplify)  $f(\frac{1}{x})$

c)  $(f(x))^2 + 1$

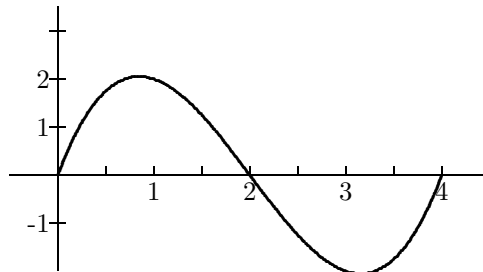
d)  $f(x+h) - f(x)$

7. (15) Consider the function  $f(x) = \frac{3}{2-x}$ .

1. (20 points) The entire graph of  $y = f(x)$  is shown in the figure.
- a) What is the domain of  $f$ ? \_\_\_\_\_ b) What is the range of  $f$ ? \_\_\_\_\_
  - c) List all the roots of  $f$ . \_\_\_\_\_
  - d) List all the intervals on which  $f$  is decreasing. \_\_\_\_\_
  - e) Is  $f$  concave up or concave down at  $x = 1$ ? \_\_\_\_\_
  - f) What is  $f(4)$ ? \_\_\_\_\_ Is this function invertible? Explain.



2. (10) a) Explain in a sentence or two i) what the key property of a function is; and ii) why this is a desirable property.
- b) Sketch a graph that is not a function. Tell how & where your graph violates the definition.
3. (10) Without a wider view of the function, the following sketch could be a cubic, or it could be a trig function. Find two equations (one of each type) to describe the graph.



4. (10) Find the equation for the line  $L$  in the figure. The number  $b$  is a positive constant.