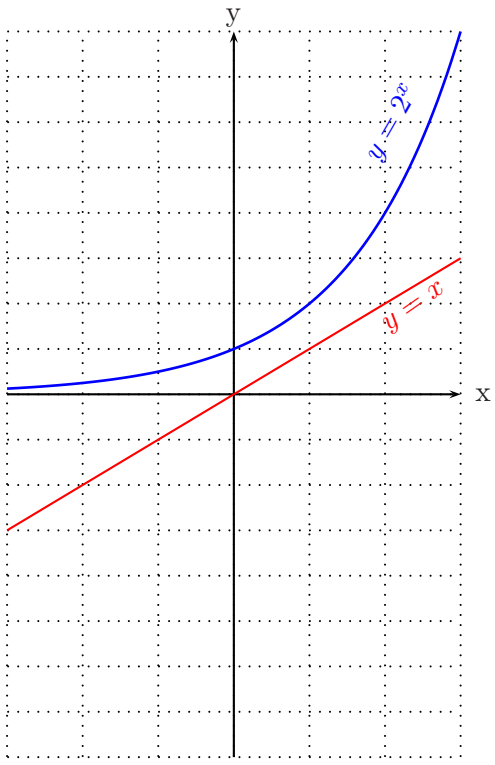
Second Quiz for Math 30, section 6432

Directions: You should fully justify your answers. Do all your work on separate paper, and make sure to *print* your name in the first sheet and staple all the sheets together. **Unstapled, loose pieces of paper will not be graded.** This quiz is due Wednesday February 27, at 6:00 PM.

1. Let $f(x) = \sqrt{x+1}$ and $g(x) = x + 3$. Find the domain and the formula for
   (a) $f + g$
   (b) $f \cdot g$
   (c) $\dfrac{f}{g}$
   (d) $f \circ g$

2. Let $f(x) = \dfrac{x+2}{x}$ and $g(x) = \dfrac{2}{x-1}$.
   (a) Find $f \circ g$ and $g \circ f$.
   (b) What does your result mean?
   (c) What is the range of f?

3. The graph of the function $f(x) = 2^x$ is shown bellow together with the graph of the diagonal $y = x$. Explain why f has an inverse function and then sketch the graph of $y = f^{-1}(x)$ on the same grid.



4. For each of the following functions find the domain, the range and the inverse function.
   (a) $f(x) = 4x - 5$
   (b) $g(x) = \dfrac{5}{x-1}$
   (c) $h(x) = x^3 - 4$
   (d) $k(x) = \sqrt{-x}$

5. **Extra Credit:** Consider the following function:

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

   (a) Use the method of *completing the square* to put this quadratic function in standard form.
   (b) Graph $y = f(x)$.
   (c) Prove that this function does not have an inverse function.
   (d) How can we restrict the domain of f so that it has an inverse function?
   (e) After the domain of f has been restricted as in part (d) find f^{-1}.