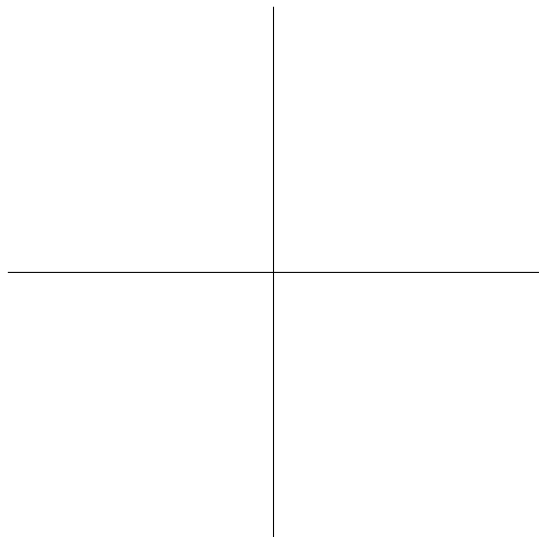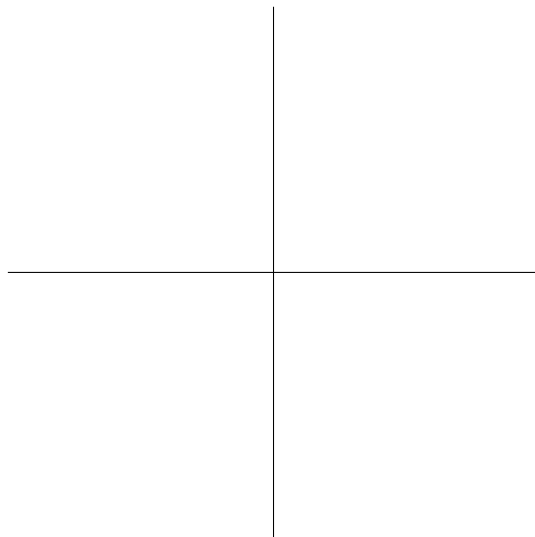1. Sketch small graphs for each of:
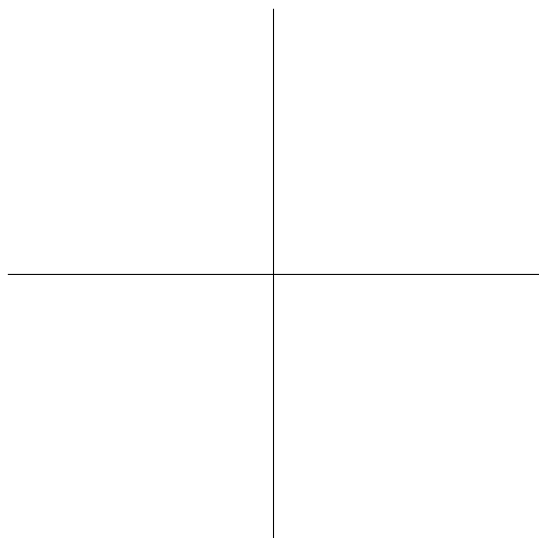
$$f(x) = |x| + 2, (x-1)^2, \frac{x-2}{x-3}, \sqrt{x}.$$

Be sure to label important points and other important properties of the graph, such as intercepts and asymptotes if they exist.
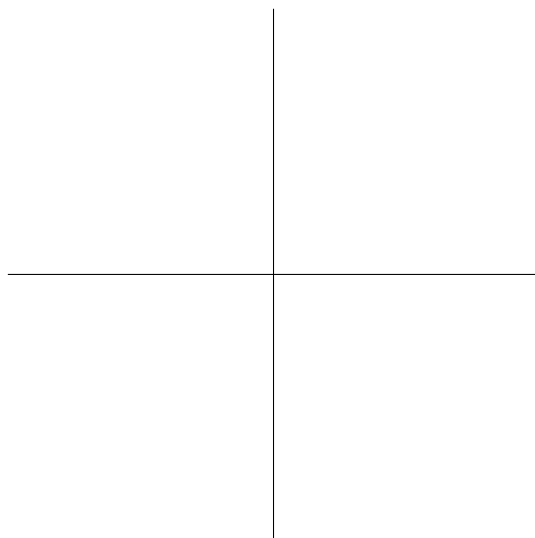
$y = |x| + 2$

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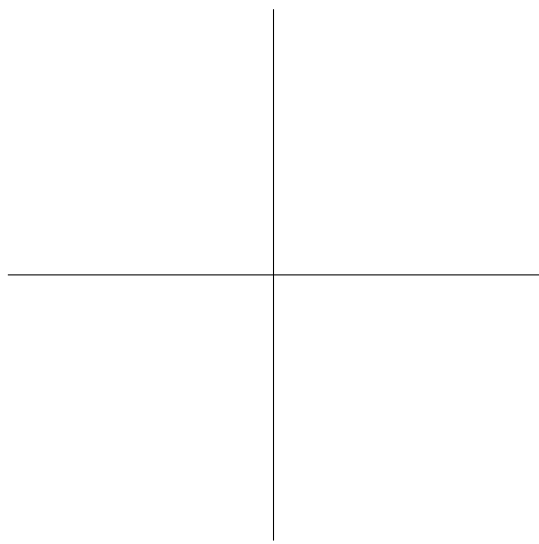
$y = \frac{x-2}{x-3}$

$y = \sqrt{x}$

2. Sketch small graphs for each of:

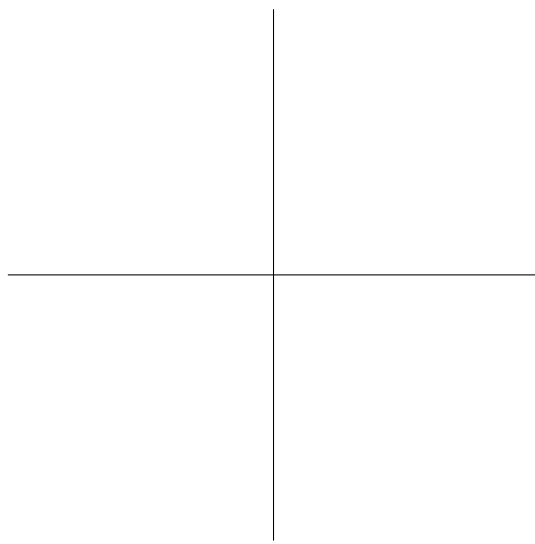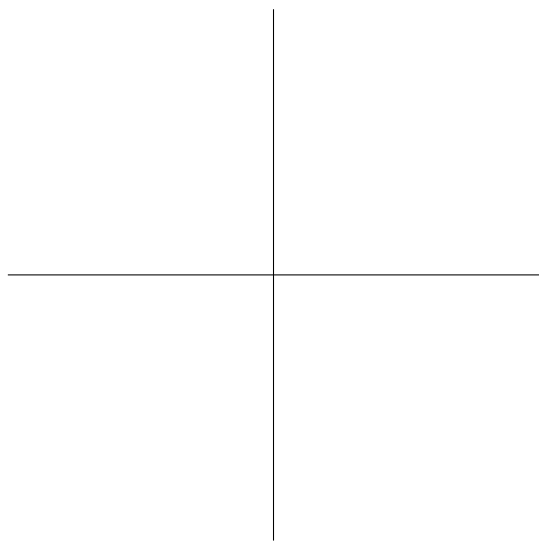$$f(x) = \sin x, x^3 + 1, e^x, \ln(x - 1)$$

Be sure to label important points and other important properties of the graph, such as intercepts and asymptotes if they exist.

$y = \sin x$

$y = x^3 + 1$

$y = e^x$

$y = \ln x$

3. Answer the following questions.

   (a) Find the maximum of the function $f(x) = -2x^2 + 12x - 7$.

   (b) Find the inverse of the function $g(x) = \frac{\ln(x+3)-1}{3}$.

(c) Suppose you invest $10,000$ in an account paying an annual interest rate of 3% compounded continuously. How many years later will your money double? Leave your answer as an expression involving ln.

(d) Find the average rate of change of the function $f(x) = \frac{x}{x^2-3}$ from $x = 1$ to $x = 3$.

4. Let $f(x) = 2 \ln x + \ln 2 - \ln(x + 3)$.

   (a) Find the domain of $f(x)$.

   (b) Find all the zeros of $f(x)$.

5. Solve for x in the interval $[0, 4\pi]$:

$$2\cos^2 x + \sin x = 1$$

Pay attention to the range of solutions!

6. Consider the function
$$f(x) = e^{2-x} - 1.$$

(a) Find the x-intercept of the graph of $f(x)$.

(b) Find the y-intercept of the graph of $f(x)$.

(c) List all the transformations in order that are applied to $y = e^x$ in order to get to the function $f(x)$.

(d) What is the behaviour of $f(x)$ as $x \to \infty$?

(e) What is the behaviour of $f(x)$ as $x \to -\infty$.

(f) Sketch a graph of $y = f(x)$. Label all the important aspects of the graph.

(g) Sketch a graph of $y = -f(x)$. Label all the important aspects of the graph.

7. Let
$$f(x) = -2\sin(2x + \pi) - 1.$$

(a) Determine the amplitude and the period of $f(x)$.

(b) Find two values of x for which $f(x) = 0$.

(c) Find two values of x for which $f(x)$ is minimized.

(d) Determine the range of $f(x)$.

(e) Sketch the graph of $y = f(x)$ for at least one period. Make sure that you label the important aspects of the graph.

8. Consider $p(x) = x^3 - 7x - 6$.

   (a) Find all roots of $p(x)$.

   (b) Sketch the graph of $p(x)$. Label the x and y-intercepts of the graph.

Problem 8. continuing!!!

(c) Let
$$f(x) = \frac{x-2}{p(x)}.$$
Determine the domain of $f(x)$.

(d) Find the vertical and horizontal asymptotes of the graph of $f(x)$ is they exist.

(e) Graph the function $f(x)$. Be sure to identify all asymptotes, intercepts, and other points of interest.

9. (a) Compute $\csc(227\pi/4)$ exactly.

(b) Compute $\sin(\arctan(5))$ exactly.

(c) Find $\sec t$, if t is in the third quadrant and $\tan t = 3$.

(d) Write $\sin(\arctan(a))$ as an expression of a not involving any trigonometric functions or their inverses.

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