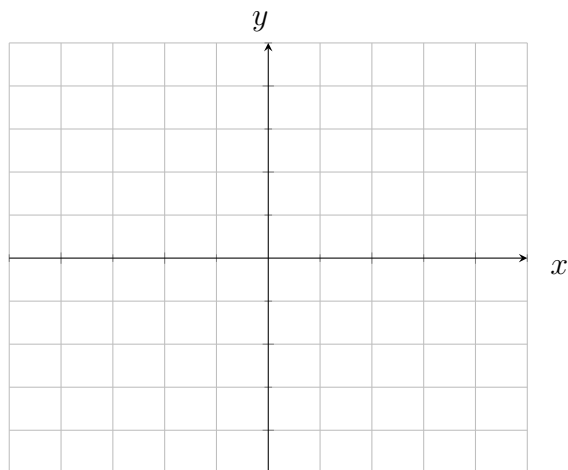1. Consider the function $f(x) = x^4 - x^2$.

   • Find the domain of f.

   • Find the x and y intercepts of the graph of $f(x)$.

   • Determine symmetry.

   • Find all asymptotes.

   • Determine when f is increasing and decreasing.

   • Determine the concavity of f.

   • Sketch the curve $y = f(x)$.

2. Consider the function $f(x) = \frac{x}{\sqrt{x^2+1}}$

   - Find the domain of f.

   - Find the x and y intercepts of the graph of $f(x)$.

   - Determine symmetry.

   - Find all asymptotes.

   - Determine when f is increasing and decreasing.

   - Determine the concavity of f.

   - Sketch the curve $y = f(x)$.
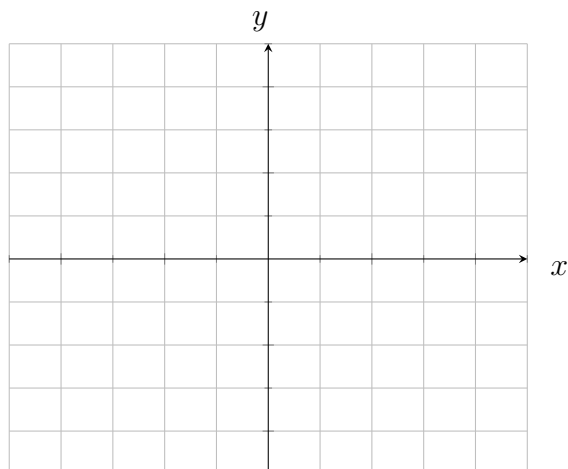
3. The curve of $f(x) = \frac{x^3 + 2x^2 - 4}{x^2 + 2}$ has a slant asymptote. Find the slant asymptote.

4. The sum of two positive numbers is 16. Find the smallest possible value of the sum of their squares.

5. A rectangle is bounded by the x- and y-axes and the graph of $y = 5 - \frac{1}{2}x$. What length and width should the rectangle have so that its area is a maximum?

6. An open box with a rectangular base is to be constructed from a 16 in. by 21 in. piece of cardboard by cutting out squares from each corner and bending up the sides. Find the dimensions of the box that will have the largest volume.