Worksheet 12: Review

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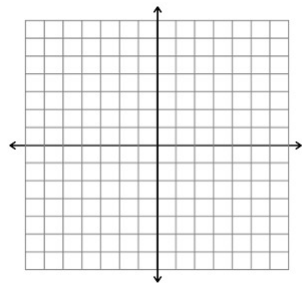
1. Sketch the following:

   (a) $f(x) = arctan(x)$
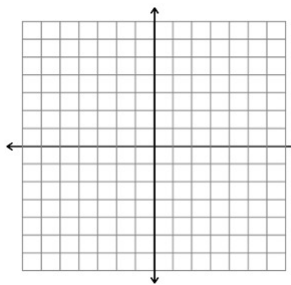
   What are the asymptotes?

   What is $f(1)$?

   (b) $f(x) = \frac{1}{4^{\frac{1}{x}}}$

   What are the asymptotes?

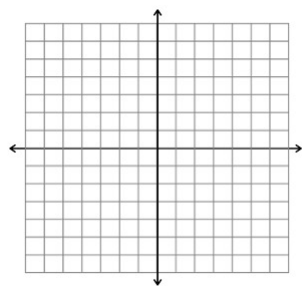2. Evaluate the limit: $\lim\limits_{x \to \infty} \sqrt{x^4 + 3x + 4}$.

3. Determine the infinitary limit: $\lim\limits_{x \to \infty} \dfrac{x^2 - x - 2}{x + 1}$.

4. Find the values at which f is discontinuous. Let f be defined by $f(x) = x+1$ if $x < 0$, $f(x) = e^x$ for $0 \leq x \leq 1$, and $f(x) = 2 - x$ if $x > 1$.
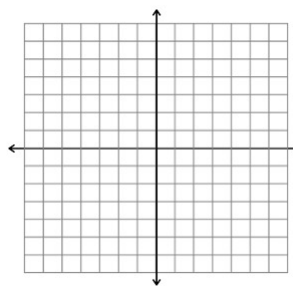
5. Differentiate $(x^3 + 1)e^x$.
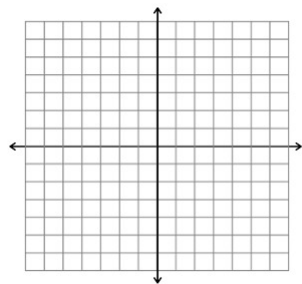
6. Sketch a function with following derivative:

(a) $f'(x) = x^2$

(b) $f'(x) = arctan(x)$

(c) $f'(x) = sin(x)$

7. Show that there exists a root of $arcsin(x) = 4x + 1$ over the real numbers.

8. Find the equation of the tangent line to the curve $y = x^4 - 1$ at the point where $x = 1$.