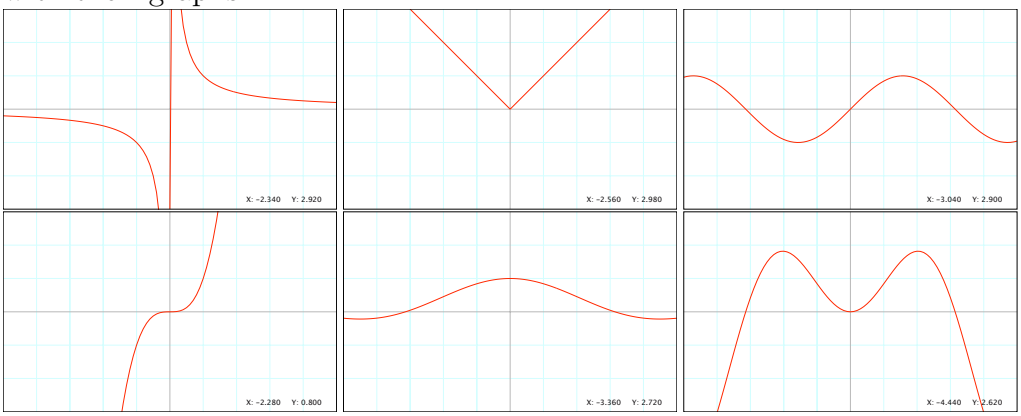
Review from Calculus
Math 301

I. The following are graphs of functions listed below. Match the functions with their graphs.



(i) $f(x) = \sin(x)$ (ii) $f(x) = x\sin(x)$ (iii) $f(x) = x^3$

(iv) $f(x) = \frac{\sin(x)}{x}$ (v) $f(x) = \frac{1}{x}$ (vi) $f(x) = |x|$

II. We write

$$\lim_{x \to a-} f(x) = L$$

if we can make values of $f(x)$ artbitrarily close to L by taking x to be sufficiently close to a and less than a.
Similarly for $x > a$ we write

$$\lim_{x \to a+} f(x) = R.$$

If $L = R$ then this number is the limit of $f(x)$ as x tends to a and is denoted by

$$\lim_{x \to a} f(x) = L.$$

Compute the following limits for every f listed in Problem I (use graphs if you like) if they EXIST!

(i)

$$\lim_{x \to 1} f(x)$$

(ii)

$$\lim_{x \to 0} f(x)$$

III We say that f is continuous at a if limit of $f(x)$ as x tends to a exist and

$$\lim_{x \to a} f(x) = f(a).$$

Check whether the function you are considering is continuous at 0.

IV. Compute $\frac{df(x)}{dx}$ for the functions in Problem I and evaluate at x=0 (If it EXISTS!).

V. Evaluate

(i)

$$\int xe^x dx.$$

(ii)

$$\int \frac{x+1}{x^2-4} dx.$$