Thomas Calculus

002 Calculus and Technical English

Book Notes

0.1　Functions, Graphs, and Lines

parallel to 平行
vertical line 垂线
inverse 反函数
Interval notation 区间表示法
Polynomials
wiggle 摆动
Rational functions
Exponentials and logarithms
Trig functions
functions involving absolute values

1. functions: their domain, codomain, and range, and the vertical line test;

2. inverse functions and the horizontal line test;

3. composition of functions;

4. odd and even functions;

5. graphs of linear functions and polynomials in general, as well as a brief survey of graphs of rational functions, exponentials, and logarithms; and

6. how to deal with absolute values.

0.1.1　function

about inverse
If the domain of a function f can be restricted so that f has an inverse f^-1 then

- $f(f^{-1}(y)) = y$ for all y in the range of f ; but
- $f^{-1}(f(x))$ may not equal x; in fact, $f^{-1}(f(x)) = x$ only when x is in the restricted domain.

about composition notation
Another way of expressing $f(x) = h(g(x))$ is to write $f = h \circ g$; here the circle means "composed with." That is, f is h composed with g, or in other words, f is the composition of h and g. What's tricky is that you write h before g (reading from left to right as usual!) but you apply g first.

0.2　Review of Trigonometry

- angles in radians and the basics of the trig functions;
- trig functions on the real line (not just angles between 0∘ and 90∘);
- graphs of trig functions; and
- trig identities.

0.3　Introduction to Limits

intuitive 直观的

- an intuitive idea of what a limit is;
- left-hand, right-hand, and two-sided limits, and limits at ∞ and $-\infty$;
- when limits fail to exist; and
- the sandwich principle (also known as the "squeeze principle").

But here's something important: the regular two-sided limit at x = a exists exactly when both left-hand and right-hand limits at x = a exist and are equal to each other!

we now have a formal definition of the term "vertical asymptote" : "f has a vertical asymptote at x = a" means that at least one of $\lim_{x \to a+} f(x)$ and $\lim_{x \to a-} f(x)$ is equal to ∞ or $-\infty$.