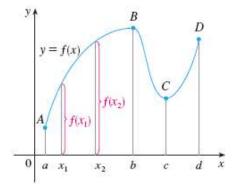
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Increasing and Decreasing Functions

The graph shown in Figure 22 rises from A to B, falls from B to C, and rises again from C to D. The function f is said to be increasing on the interval [a,b], decreasing on [b,c], and increasing again on [c,d]. Notice that if x_1 and x_2 are any two numbers between a and b with $x_1 < x_2$, then $f(x_1) < f(x_2)$. We use this as the defining property of an increasing function.

Figure 22



A function f is called **increasing** on an interval I if

$$f(x_1) < f(x_2)$$
 whenever $x_1 < x_2$ in I

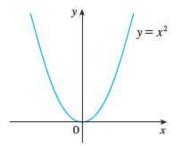
It is called decreasing on I if

$$f(x_1) > f(x_2)$$
 whenever $x_1 < x_2$ in I

In the definition of an increasing function it is important to realize that the inequality $f(x_1) < f(x_2)$ must be satisfied for *every* pair of numbers x_1 and x_2 in I with $x_1 < x_2$.

You can see from Figure 23 that the function $f(x) = x^2$ is decreasing on the interval $(-\infty, 0]$ and increasing on the interval $[0, \infty)$.

Figure 23



Chapter 1: Functions and Models Increasing and Decreasing Functions

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