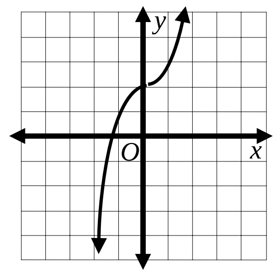
Lesson 10-4

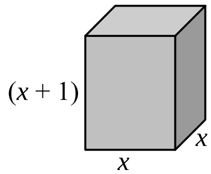
Example 1 Graph a Cubic Function
Graph $y = x^3 + 2$.

x	$y = x^3 + 2$	(x, y)
−1.5	$(-1.5)^3 + 2 \approx -1.4$	(−1.5, −1.4)
−1	$(-1)^3 + 2 = 1$	(−1, 1)
0	$(0)^3 + 2 = 2$	(0, 2)
1	$(1)^3 + 2 = 3$	(1, 3)
1.5	$(1.5)^3 + 2 \approx 5.4$	(1.5, 5.4)



Example 2 Real-World Example

CARPENTRY A carpenter wants to build a wooden cabinet with a square base of side length *x* feet and a height of (*x* + 1) feet as shown.

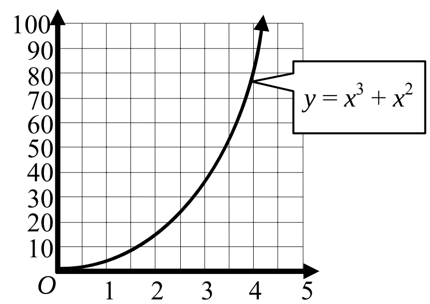


Write the function for the volume *V* of the cabinet. Graph the function. Then estimate the dimensions of the cabinet that would give a volume of approximately 70 cubic feet.

$V = \ell wh$	Volume of a rectangular prism
$V = x \cdot x \cdot (x + 1)$	Replace ℓ with x, w with x, and h with $(x + 1)$.
$V = x^2(x + 1)$	$x \cdot x = x^2$
$V = x^3 + x^2$	Distributive Property and Commutative Property

The function for the volume V of the cabinet is $V = x^3 + x^2$. Make a table of values to graph this function. You do not need to include negative values of x since the side length of the cabinet cannot be negative.

x	$V = x^3 + x^2$	(x, V)
0	$(0)^3 + (0)^2 = 0$	(0, 0)
0.5	$(0.5)^3 + (0.5)^2 \approx 0.4$	(0.5, 0.4)
1	$(1)^3 + (1)^2 = 2$	(1, 2)
1.5	$(1.5)^3 + (1.5)^2 \approx 5.6$	(1.5, 5.6)
2	$(2)^3 + (2)^2 = 12$	(2, 12)
2.5	$(2.5)^3 + (2.5)^2 \approx 21.9$	(2.5, 21.9)
3	$(3)^3 + (3)^2 = 36$	(3, 36)
3.5	$(3.5)^3 + (3.5)^2 \approx 55.1$	(3.5, 55.1)
4	$(4)^3 + (4)^2 = 80$	(4, 80)



Looking at the graph, we see that the volume of the cabinet is approximately 70 cubic feet when x is about 3.75 feet.

The dimensions of the cabinet when the volume is about 70 cubic feet are 3.75 feet, 3.75 feet, and 3.75 + 1 or 4.75 feet.