

## Math 150 Quiz 1

You have 15 minutes to finish this quiz. There is ONE problem, which consists of THREE parts (the third part is on the back). Show all your work clearly TO RECEIVE FULL CREDITS.

Please write down your name and session (9:30 or 10:30) at the top of this page.

Let  $f(x) = 3 - (x + 2)^2$ .

a) Determine the basic function and graph it, making sure to plot at least three reference points on the graph.

Basic function:  $x^2$ .

$x$	$y = x^2$	points
0	$0^2 = 0$	$A(0, 0)$
1	$1^2 = 1$	$B(1, 1)$
-1	$(-1)^2 = 1$	$C(-1, 1)$

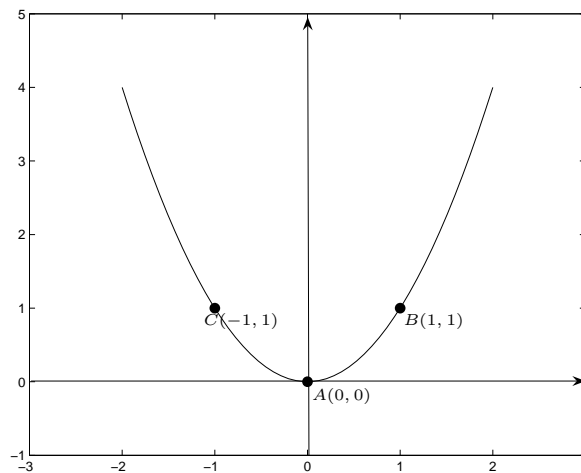


Figure 1: The basic function  $x^2$ .

b) Write down a sequence of transformations which will transform the graph of the basic function into the graph of  $f$ .

- (1).  $x^2 \rightarrow (x + 2)^2$ : shift to *left* by 2.
- (2).  $(x + 2)^2 \rightarrow -(x + 2)^2$ : reflect about the  $x$ -axis.
- (3).  $-(x + 2)^2 \rightarrow 3 - (x + 2)^2$ : shift up by 3.

Warning: if you switch (2) and (3), then you will have

- (1).  $x^2 \rightarrow (x + 2)^2$ : shift to left by 2.

(2).  $(x + 2)^2 \rightarrow 3 + (x + 2)^2$ : shift up by 3.

(3).  $3 + (x + 2)^2 \rightarrow -[3 + (x + 2)^2] = -3 - (x + 2)^2$ : not what we want!

c) Sketch the graph of  $f$ , making sure to plot the three points which correspond to the three reference points you chose in part a).

$$\begin{array}{l} A(0, 0) \xrightarrow{\text{shift to left}} A(-2, 0) \xrightarrow{\text{reflect}} A(-2, 0) \xrightarrow{\text{shift up}} A(-2, 3) \\ B(1, 1) \xrightarrow{\text{shift to left}} B(-1, 1) \xrightarrow{\text{reflect}} B(-1, -1) \xrightarrow{\text{shift up}} B(-1, 2) \\ C(-1, 1) \xrightarrow{\text{shift to left}} C(-3, 1) \xrightarrow{\text{reflect}} C(-3, -1) \xrightarrow{\text{shift up}} C(-3, 2) \end{array}$$

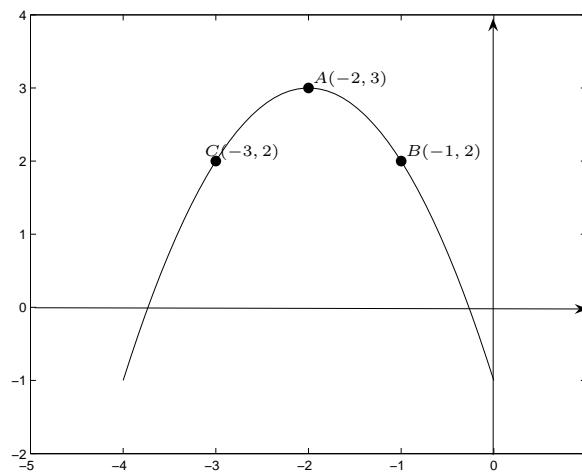


Figure 2: The original function  $3 - (x + 2)^2$ .