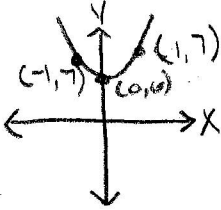


**Useful Techniques:**

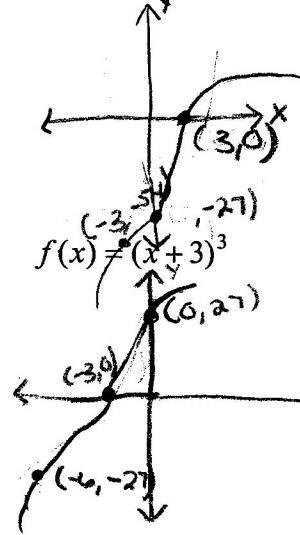
- \* Vertical shifts:  $y = f(x) + k$  (shift up by  $k$  units),  $y = f(x) - k$  (shift down by  $k$  units),  $k > 0$ .
- \* Horizontal shifts:  $y = f(x + h)$  (shift left by  $h$  units),  $y = f(x - h)$  (shift right by  $h$  units),  $h > 0$ .
- \* Symmetry with respect to the  $x$ -axis:  $y = -f(x)$  [Reflection about the  $x$ -axis]
- \* Symmetry with respect to the  $y$ -axis:  $f(-x) = f(x)$ , an "Even Function." [Reflection about the  $y$ -axis]
- \* Symmetry with respect to the origin:  $f(-x) = -f(x)$ , an "Odd Function."

Graph each function using the techniques of shifting, and/or reflecting.  
 Label at least three points on the graph, if any.

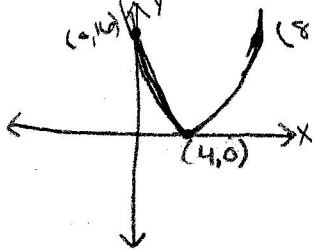
1. a)  $f(x) = x^2 + 6$



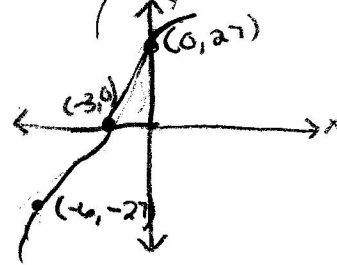
b)  $f(x) = x^3 - 27$



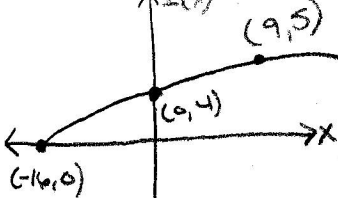
2. a)  $f(x) = (x-4)^2$   $x=4$   $x^2 - 8x + 16$



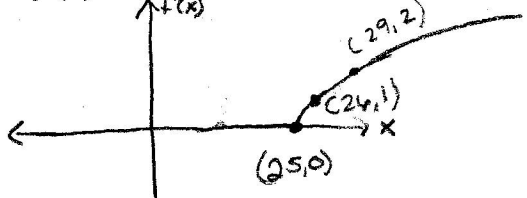
b)  $f(x) = (x+3)^3$



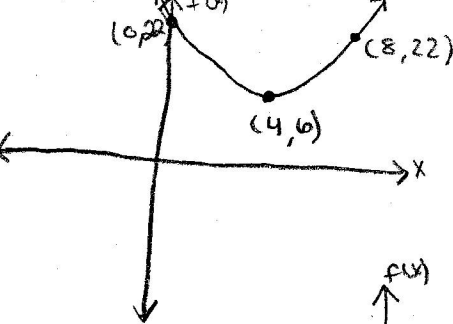
3. a)  $f(x) = \sqrt{x+16}$



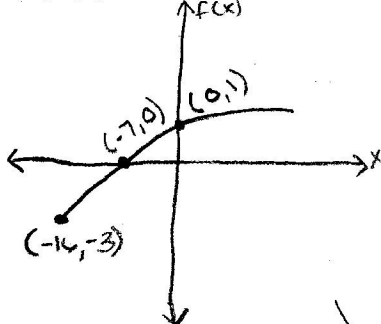
b)  $f(x) = \sqrt{x-25}$



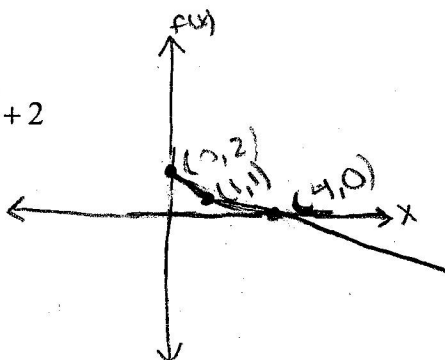
4. a)  $f(x) = (x-4)^2 + 6$   $x=4$



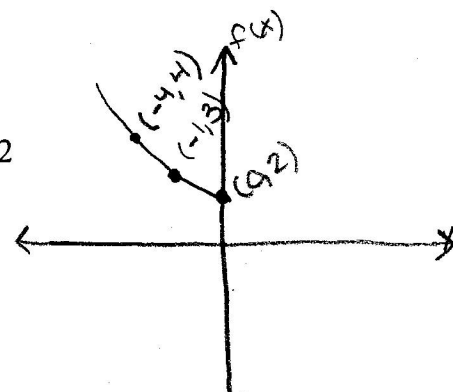
b)  $f(x) = \sqrt{x+16} - 3$



5. a)  $g(x) = -\sqrt{x} + 2$



b)  $f(x) = \sqrt{-x} + 2$



*Handwritten notes:*  
 20/12  
 Good  
 26