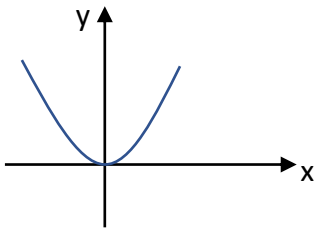
National 5 Homework	
Algebraic Skills	Using the discriminant and describing roots

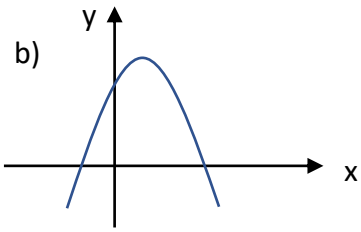
1. Calculate the discriminant of each of these quadratic functions

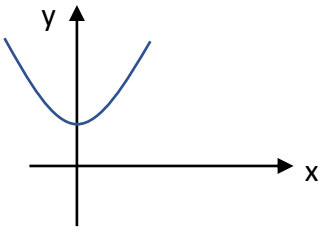
a) $f(x) = x^2 + 5x + 2$ b) $f(x) = x^2 + 7x - 1$ c) $f(x) = x^2 - 6x - 5$ d) $f(x) = x^2 + x + 1$

2. Clearly state the number and nature of the roots of quadratic whose discriminant is greater than zero.

3. State the number and nature of the roots for each quadratic function shown below.

a) 

b) 

c) 

4. For what range of values of p does the quadratic function

$$f(x) = 3x^2 + 2x + p$$

have no real roots.

5. Clearly describe the number and nature of roots for each discriminant condition stated below.
   a. $b^2 - 4ac < 0$
   b. $b^2 - 4ac = 0$
   c. $b^2 - 4ac > 0$

6. A quadratic function has equation $f(x) = ax^2 + bx + c = 0$ where $a < 0$ and $b^2 - 4ac = 0$.

   Sketch a possible graph of $y = f(x)$.

7 Find the value of k for which the quadratic function $f(x) = kx^2 - 6x + 4$ has equal roots.

8. Sketch a possible graph of $y = ax^2 + bx + c$ where $a > 0$ and $b^2 - 4ac < 0$.

9. Find the range of values of p if the quadratic function $f(x) = px^2 - 3x - 6$ has no real roots.

10. State the number and nature of the roots for each quadratic function below:

    a. $f(x) = 3x^2 - 4x - 4$ b. $f(x) = 4x^2 - 20x + 25$ c. $f(x) = 2x^2 + 3x + 7$

11. Sketch a possible graph for each of the functions in question 9, clearly indicating where each graph crosses the y - axis.