

Name:

Result:

1.

[6 points]

Find a quadratic equation which satisfies the following conditions:

a) Vertex at $(1, -1)$, y -intercept at $y = -2$.

b) One of the x -intercepts at $(4, 0)$, axis of symmetry at $x = \frac{1}{2}$, graph passes through $(2, 5)$.

c) Graph passes through $(0, 3)$, $(1, 8)$ and $(2, 17)$.

2.*[6 points]*

Consider the following equation:

$$3x^2 - x - 5 = 0$$

Let the solutions be α and β . Without solving the equation, find the value of:

(a) $\alpha^2 + \beta^2$

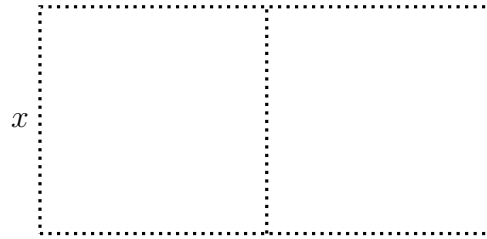
(b) $\frac{1}{\alpha} + \frac{1}{\beta}$

(c) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$

3.

[4 points]

Farmer has 200 metres of fencing to produce a fenced enclosure in the following shape:



Let x be the width of the enclosure as shown on the diagram.

- (a) Express the area of the enclosure in terms of x only.
- (b) Find the value of x that maximizes the area and find this maximal area.

4.[5 *points*]

Consider the equation:

$$x^2 + (k - 1)x + 2k + 3 = 0$$

Find the values of parameter k for which the equation has two real, **positive** solutions.

5.[4 *points*]

The height of a ball t seconds after it is thrown is modeled by the function:

$$h(t) = 24t - 4.9t^2 + 1$$

where h is the height of the ball in metres.

- (a) Find the maximum height reached by the ball.
- (b) When will the ball hit the ground?
- (c) For what length of time will the ball be higher than 20 metres?