Solve the following system of equations.

$$3x^2 + 2y^2 = 77$$
$$4x^2 - 3y^2 = 97$$

Solution(s): ☐

- Enter your answers as points: (x, y)
- Because these systems are non-linear, you may have more than one solution.
- If you have more than one solution, enter your answers as a list of points: $(x_0, y_0), (x_1, y_1)$
- Use 'sqrt(...)' to enter radical answers, do not use decimal approximations.

Hint:

Solution:

Elimination

$$\text{(A)} \quad 3x^2 + 2y^2 = 77$$
$$\text{(B)} \quad 4x^2 - 3y^2 = 97$$

1. Choose to eliminate x.

$$-4\text{(A)} \quad -12x^2 - 8y^2 = -308$$
$$3\text{(A)} \quad 12x^2 - 9y^2 = 291$$
$$\overline{ -17y^2 = -17}$$
$$y^2 = 1$$
$$y = \pm 1$$

2. Solve for x. Let y = -1

$$4x^2 - 3y^2 = 97 \qquad x = \pm 5$$
$$4x^2 - 3(1) = 97$$
$$4x^2 - 3 = 97 \quad \rightarrow \quad (-5, -1), (5, -1)$$
$$4x^2 = 100$$
$$x^2 = 25 \qquad \text{are solutions}$$

Let $y = 1$

$4x^2 - 3(1) = 97$

$4x^2 - 3 = 97 \rightarrow (-5, 1)(5, 1)$ are solutions.

$4x^2 = 100$

$x^2 = 25$

$x = \pm 5$

$\therefore$ Solutions

$(x, y) \in \{(-5, -1), (-5, 1), (5, -1), (5, 1)\}$

four solutions.