
For the next problems, show all work to receive full credit. No Work = No Credit.

1. Solve the following system of linear equations:

$$5x - 2y = 4$$

$$2x - 3y = 5$$

Multiply the top equation by 3 and the bottom equation by -2 :

$$15x - 6y = 12$$

$$-4x + 6y = -10$$

Adding these equations, we get”

$$11x = 2$$

$$x = \frac{2}{11}$$

Plugging back in:

$$2x - 3y = 5$$

$$2\left(\frac{2}{11}\right) - 3y = 5$$

$$\frac{4}{11} - 3y = 5$$

$$-3y = \frac{51}{11}$$

$$y = -\frac{51}{33} = -\frac{17}{11}$$

2. A shoe store owner will buy 10 pairs of a certain shoe if the price is \$75 per pair, and 30 pairs if the price is \$25. The supplier of the shoes is willing to provide 35 pairs if the price is \$80 per pair and 5 pairs if the price is \$20. Assuming the supply and demand functions for the shoes are linear, find the market equilibrium point.

Demand Function:

$$m = \frac{75 - 25}{10 - 30} = \frac{50}{-20} = -\frac{5}{2}$$

$$p - 10 = -\frac{5}{2}(q - 75)$$

$$p = -\frac{5}{2}q + \frac{375}{2} + 10$$

$$p = -\frac{5}{2}q + 197.5$$

Supply Function:

$$m = \frac{80 - 20}{35 - 5} = \frac{60}{30} = 2$$

$$p - 20 = 2(q - 5)$$

$$p = 2q - 10 + 20$$

$$p = 2q + 10$$

Equilibrium point:

$$-\frac{5}{2}q + 197.5 = 2q + 10$$

$$187.5 = 4.5q$$

$$\frac{375}{2} = \frac{9}{2}q$$

$$\frac{375}{9} = q$$

$$q \approx 41.67$$

$$p = 2q + 10$$

$$= 2\frac{375}{9} + 10$$

$$\approx 93.33$$