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

1. Solve the following system of linear equations:

$$-4x + 3y = -5$$

$$3x - y = 4$$

Using the second equation:

$$y = 3x - 4$$

Plugging into the first equation:

$$-4x + 3(3x - 4) = -5$$

$$-4x + 9x - 12 = -5$$

$$5x - 12 = -5$$

$$5x = 7$$

$$x = \frac{7}{5}$$

Plugging back in:

$$3x - y = 4$$

$$3\left(\frac{7}{5}\right) - y = 4$$

$$\frac{21}{5} - 4 = y$$

$$\frac{1}{5} = y$$

Therefore the solution is $x = \frac{7}{5}$ and $y = \frac{1}{5}$

2. Retailers will buy 45 cordless phones from a wholesaler if the price is \$10 each and will buy 20 if the price is \$60 each. The wholesaler will supply 35 phones at \$30 each and 70 at \$50 each. Assuming the supply and demand functions are linear, find the market equilibrium points.

Demand Function:

$$m = \frac{60 - 10}{20 - 45} = \frac{50}{-25} = -2$$

$$p - 10 = -2(q - 45)$$

$$p = -2q + 90 + 10$$

$$p = -2q + 100$$

Supply Function:

$$m = \frac{50 - 30}{70 - 35} = \frac{20}{35} = \frac{4}{7}$$

$$p - 30 = \frac{4}{7}(q - 35)$$

$$p = \frac{4}{7}q - 20 + 30$$

$$p = \frac{4}{7}q + 10$$

Equilibrium point:

$$\frac{4}{7}q + 10 = -2q + 100$$

$$\frac{18}{7}q = 90$$

$$q = 90 \left(\frac{7}{18} \right) = 35$$

$$p = -2q + 100$$

$$= -2(35) + 100$$

$$p = 30$$