

Examples of a system of linear equations

A charity wishes to endow a fund that will provide \$50000 per year for cancer research. The charity has \$480000 and , to reduce risk, wants to invest in two banks paying 10% and 11 % respectively.
How much should be invested in each bank?

$$\begin{aligned}x + y &= 480000 \\0.1x + 0.11y &= 50000\end{aligned}$$

$$\begin{aligned}10x + 10y &= 4800000 \\10x + 11y &= 5000000\end{aligned}$$

$$\begin{aligned}y &= 200000 \\x &= 280000\end{aligned}$$

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Tax benefits of charitable contribution

A company earns before-tax profits of \$100000. It has agreed to contribute 10% of its after-tax profits to Red Cross Relief Fund. It must pay a state tax of 5 % of its profits (after the Red Cross donation) and a federal tax of 40 % of its profit (after the donation and state taxes are paid). How much does the company pay in state taxes, federal taxes and Red Cross donation?

$$\begin{aligned}C + 0.1S + 0.1F &= 10000 \\0.05C + S &= 5000 \\0.4C + 0.4S + F &= 40000\end{aligned}$$

$$C = 5956, S = 4,702, F = 35,737$$

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Suppose that you are at a bench-press contest and have just witnessed the Lightweight Champion press a bar weighted with 2 large disks and 1 small disk on each side and the weight is announced as 275 pounds. Then the eventual middleweight champion pressed a bar with 3 large disk and 1 small disk on each side, the weight is announce 365 pounds. The heavyweight champion lifts a bar weighted with 4 large disks and 1 small disk, but you cannot hear announced weight. Assuming the bar weighted 45 pounds, how much did the heavyweight lift?

Ans: $X=45$ and $y=25$

A foolish dieter, following the instructions of his nutritionist to the letter, is insistent that fat constitute exactly 10% of his diet. On a certain day, he must Select from a menu consisting strictly of 92% fat-free turkey bologna and hog Lard, which is virtually 100% fat. How much of each should he consume if he wishes to eat 10 pounds of food.

Ans: $X=9.8$, $y=0.2$

A manufacturer produces three products: A, B, and C. The profits for each unit of A, B and C sold are \$1, \$2 and \$3 respectively. Fixed costs are \$17000 per year, and the costs of producing each unit of A, B and C are **\$4, \$5, \$7**, respectively. Next year, a total of 11,000 units of all three products is to be produced and sold, and the total profit of \$25,000 is to be realised. If the total cost is to be \$80,000, how many units of each of the products should be produced next year?

$A=2000, B=4000, C=5000$