

Math Exam – PrelB 3.AB 3

Systems of Linear Equations

Ád'a Klepáčů

March 9, 2023

DON'T FORGET TO EXPLAIN EVERYTHING EVEN IF YOU THINK IT'S OBVIOUS!

You're selling **Marvel Comics** and **Avatar** toys. As **Avatar** is trending right now, you sell one **Avatar** toy for \$40. **Marvel Comics** toys don't sell as well and you can only cash in \$20 apiece.

Denote the number of sold **Marvel Comics** toys by m and the number of sold **Avatar** toys by a .

- (a) **Define a linear function** $A(m, a)$ in variables m and a which calculates **your total revenue** based on the number of sold **Marvel Comics** and **Avatar** toys.

It seems you're not the only one in the neighbourhood selling toys. Your competitor seems to think that **Marvel Toys** don't really sell and only prices them at \$15. On the other hand, he prices **Avatar** toys at a whopping \$45.

Surprisingly, at the end of the day, **both of you sold the same number of each type of toy**. Your competitor's aggressive pricing paid off as he earned \$1050 and you earned only \$1000.

- (b) **Define a linear function** $B(m, a)$ in variables m and a which calculates **your competitor's revenue** based on the number of **Marvel Comics** and **Avatar** toys he sold.
- (c) Write down the **system of linear equations** which allows you to calculate the number of sold toys assuming that **you earned \$1000, your competitor earned \$1050** and **both of you sold the same number of each type of toy**.
Hint: Remember, total revenues are exactly the outputs of the functions A and B .
- (d) Solve the system.

- (e) Interpret the equations of the previous system as linear functions f and g with output m and input a . Write down their definitions.
Hint: Just isolate the variable m in the equations.

In comes yet another competitor. He really doesn't like **Marvel** and prices their toys at mere \$10. But he also seems to think that **Avatar** toys are going to sell no matter what and values them just as you do, at \$40. His revenue at the end of the day is only \$800. You can see the graph of the equation determining his revenue in the grid below.

- (f) Draw the graphs of the linear functions f and g into the grid below. Did the third competitor sell the same number of each type of toy as you did? – **Read this information from the graphs!**

