

M1 Training Problems

Ted Szylowiec

tedszy@gmail.com

1 Linear equations, sketches and exact plots

1. Solve $(4x - 2) - (2x - 1) = 3x$. How many solutions does it have?
2. Solve $(3x - 2) - (2x - 1) = x$. How many solutions does it have?
3. Solve $(4x - 1) - (2x - 1) = 2x$. How many solutions does it have?
4. Solve for x . $5x + 6 = 3x + 2$. How many solutions does it have?
5. Solve for x . $5x + 2 = 5x + 2$. How many solutions does it have?
6. Solve for x . $3x + 1 = 3x - 1$. How many solutions does it have?
7. Sketch freehand, no ruler: $y = x$, $y = -x$. Put them on the same axes. Remember to label everything.
8. Sketch freehand, no ruler: $y = 2x$, $y = -2x$. Put them on the same axes.
9. Sketch freehand, no ruler.

$$y = \frac{x}{2}, \quad y = -\frac{x}{2}.$$

Put them on the same axes.

10. Sketch freehand, no ruler. Label everything.

$$y = 2x + 1.$$

11. Sketch freehand, no ruler. Label everything.

$$y = -2x - 1.$$

12. Sketch freehand, no ruler. Label everything.

$$y = -\frac{x}{2} + 3.$$

13. Sketch freehand, no ruler. Label everything.

$$y = \frac{x}{2} - 3.$$

14. Make an exact plot. Find the x and y intercepts. Show your work. Use a ruler.

$$y = 3x - 2.$$

15. Make an exact plot.

$$y = -\frac{x}{3} + 1.$$

16. Consider $y = 3x - 2$.

- (a) Make a freehand sketch, no ruler.
- (b) Make an exact plot, with a ruler. Find intercepts.

17. Consider the equation

$$2x + 3 = -\frac{x}{2} + 1.$$

- (a) Solve for x by algebra. How many solutions does it have?
- (b) Make exact plots of the left-hand side and right-hand side of the equation. Show where the solutions are.

18. Consider the equation

$$2x + 3 = 2x - 1.$$

- (a) Solve for x by algebra. How many solutions does it have?
- (b) Make exact plots of the left-hand side and right-hand side of the equation. Show where the solutions are. Make sure your plots match your algebra.

19. Consider the equation

$$-2x + 1 = -2x + 1.$$

- (a) Solve for x by algebra. How many solutions does it have?
- (b) Make exact plots of the left-hand side and right-hand side of the equation. Show where the solutions are. Make sure your plots tell the same story as your algebra.

20. Consider the equation

$$3x - 6 = x = \frac{x}{3} + 2.$$

Does this equation have a solution? Make exact plots of the left-hand side, the right-hand side, and the middle, all on the same axes. Show where the solution is, if there is one.

21. Consider the equation

$$\frac{x}{2} + 1 = 2x - 3 = -x + 4.$$

Use exact plots of left-hand side, right-hand side and middle to figure out if this has solutions. Show where the solutions are, if there are any.