

Show all work clearly and in order. Please box your answers. 10 minutes.

1. Find an equation of the line that satisfies the given conditions:

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- (a) A line which passes through the points (2,1) and (1,6).

← This was #25 on pg. A15

$$\text{Slope} = m = \frac{6-1}{1-2} = \frac{5}{-1} = -5$$

use the point-slope formula:

$$\begin{aligned} y-1 &= -5(x-2) \\ y-1 &= -5x+10 \\ \boxed{y &= -5x+11} \end{aligned}$$

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- (b) A line which line passes through the point (1,1) and is parallel to the line $3y = 2x - 6$.

$$\begin{aligned} 3y &= 2x - 6 \\ y &= \frac{2}{3}x - 2 \end{aligned}$$

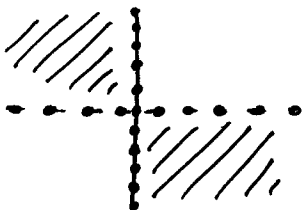
A line parallel to this line has slope $m = 2/3$

use the point-slope formula: $y-1 = \frac{2}{3}(x-1)$

$$y-1 = \frac{2}{3}x - \frac{2}{3}$$

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2. Sketch the region $\{(x,y) \mid xy < 0\}$ in the xy -plane.



↑ This was #45 on pg. A16

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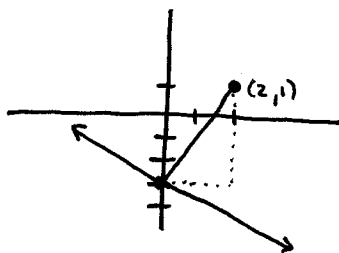
3. Tell me something about yourself.

I just got married in May and if it wasn't for math I wouldn't have met my wife!

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4. BONUS Find the shortest distance between the point (2,1) and the line $y = -\frac{1}{2}x - 3$.

The general method to solve this kind of problem is to find the line orthogonal to the given line that also passes through the point (2,1). This line would have slope $m=2$ (see notes or pg. A14) and using the point-slope formula ~~and~~ the equation of the line would be $y-1 = 2(x-2)$



$$\begin{aligned} y &= 2x-3 \\ \text{these lines intersect: } 2x-3 &= -\frac{1}{2}x-3 \\ \text{so } x &= 0 \quad \text{and } y &= -3 \quad \text{so pt. } (0,-3) \end{aligned}$$

$$\text{hence the minimum distance } D = \sqrt{(0-2)^2 + (-3-1)^2} = \sqrt{20}$$

$$\text{so } \boxed{D = 2\sqrt{5}}$$

NOTE: you could have guessed the point (0,-3) but I need to know why the lines are perpendicular.