



Math Olympiad and Problem Solving Programs  
E220 - Intermediate Math Competitions  
Problem Set 13.1 - Linear Equations

Name:

Date:

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1.  $\frac{15}{4} = 3.75$

2.  $\frac{25\pi}{4} = 6.25\pi$

3. This problem was somewhat ambiguously worded, so two answers will be accepted. If you thought the question was asking for the coordinates of the midpoint, then the midpoint is  $(-1, 2)$ , so the x-coordinate is  $-1$ .

However, the problem is actually asking for a point on the x-axis that is equally distant from  $A$  and  $B$ . That point is  $(3, 0)$ , so the x-coordinate is  $3$ .

4.  $-14$

5.  $62$

6.  $14$

7.  $C$

8.  $30$

9. Put the equations in slope-intercept form ( $y = mx + b$ ). So  $2y + x + 3 = 0$  becomes  $2y = -x - 3 \Rightarrow y = -\frac{1}{2}x - \frac{3}{2}$ , and  $3y + ax + 2 = 0$  becomes  $3y = -ax - 2 \Rightarrow y = -\frac{a}{3}x - \frac{2}{3}$ . Perpendicular lines have slopes that are inverses and that are opposite signs. So for instance, the perpendicular line of a line with slope 5 has slope  $-\frac{1}{5}$ . So since the first line has slope  $-\frac{1}{2}$ , then the perpendicular slope is 2. So we need to find  $a$  such that  $-\frac{a}{3} = 2$ . So we solve for  $a$ , and we get  $a = -6$

10.  $(2, 4)$