**MATH 102**, 🌷 2023 **Name:** ______________________

**In class work Week 1** **Row and Seat**: ______________________

In class work Week 1 has questions 1 through 3 with a total of 15 points. This assignment is due at the end of the class period at 9:55 AM.

$\boxed{5}$ 1. Find the *distance* between the points $(7,9)$ and $(-1,-2)$.

**Solution:** We have

$$\begin{aligned}\operatorname{dist}((7,9),(-1,-2)) &= \sqrt{(7+1)^2+(9+2)^2}, && \text{(distance formula)}\\ &= \sqrt{64+121}, && \text{(arithmetic)}\\ &= \sqrt{185}. && \text{(arithmetic)}\end{aligned}$$

- It's easy to misread a question–be careful. I often put what you need to find in italic type (in this case *distance*) in an attempt to clarify what you are looking for.
- The factors of 185 are 5 and 37. Neither of these factors are perfect squares, so $\sqrt{185}$ is properly simplified.
- Unless you are asked for a decimal approximation, you should leave your answers in an exact form. This problem *doesn't* ask for an exact solution, so 13.60147 is *not* a correct solution.
- A common error is to do the following:

  $$\sqrt{8^2+11^2} = 8+11 = 19.$$

  But this is **wrong**. The equation $\sqrt{x^2+y^2} = x+y$ is not an identity. You can verify this by pasting in $x=1$ and $y=1$ into the equation. The result is

  $$\left[\sqrt{1^2+1^2} = 1+1\right] = \left[\sqrt{2} = 2\right] = \text{False}$$

  For a list of other common errors, see the last section of our class Quick Reference Sheet (QRS).

$\boxed{5}$ 2. The *midpoint* of points $P$ and $(5,6)$ is $(-2,3)$. Find the *coordinates* of the point $P$.

**Solution:** Let $P = (x, y)$. We have

$$\left(\frac{x+5}{2}, \frac{y+6}{2}\right) = (-2, 3).$$

So we need to solve

$$\frac{x+5}{2} = -2,$$
$$\frac{y+6}{2} = 3.$$

for $x$ and for $y$. Solving the first equation for $x$ gives

$$\begin{aligned} \left[\frac{x+5}{2} = -2\right] &= [x+5 = -4], && \text{(multiply by 2)} \\ &= [x = -9]. && \text{(add -5)} \end{aligned}$$

And solving the second for $y$ gives

$$\begin{aligned} \left[\frac{y+6}{2} = 3\right] &= [y+6 = 6], && \text{(multiply by 2)} \\ &= [y = 0]. && \text{(add -6)} \end{aligned}$$

Solving these equations for $x$ and $y$ gives $x = -9$ and $y = 0$.

$\boxed{5}$ 3. Are the three points $(7, 9), (-1, -2)$, and $(0, 10)$ the vertices of a right triangle? Explain.

**Solution:** We have

$$\begin{aligned} \operatorname{dist}((7,9),(-1,2)) &= \sqrt{85}, && \text{(problem 1)} \\ \operatorname{dist}((-1,2),(0,10)) &= \sqrt{1^2+8^2} = \sqrt{65}, \\ \operatorname{dist}((0,10),(7,9)) &= \sqrt{49+1^2} = \sqrt{50}. \end{aligned}$$

The largest of these numbers is $\sqrt{85}$. But $\sqrt{85}^2 \neq \sqrt{65}^2 + \sqrt{50}^2$, so the three points $(7, 9), (-1, -2)$, and $(0, 10)$ are *not* the vertices of a right triangle.