Problem 1 (2 points):
The point $P(x, y)$ is equidistant from $(-3, 4)$ and $(2, -5)$. Find an equation relating x and y. You do **NOT** *need to simplify.*

Solution: This is an application of the distance formula. The distance between P and $(-3, 4)$ is $\sqrt{(x+3)^2 + (y-4)^2}$ and the distance between P and $(2, -5)$ is $\sqrt{(x-2)^2 + (y+5)^2}$. Since P is equidistant from the two points, these distances must be equal, so our equation is

$$\sqrt{(x+3)^2 + (y-4)^2} = \sqrt{(x-2)^2 + (y+5)^2}$$

We could simplify our answer further, but we don't need to.

Problem 2 (4 points): *The points $P(1, 4)$ and $Q(3, -2)$ are endpoints of the diameter of a circle.*
(a) Find the center of the circle

Solution: The center of the circle will be the midpoint of P and Q, so we apply the midpoint formula.
Therefore, the center will be at $(\frac{1+3}{2}, \frac{4-2}{2}) = (2, 1)$

(b) Find the radius of the circle. You do **NOT** *need to simplify your answer.*

Hint: *Be careful to give the radius and not the diameter.*

Solution:
Method 1: The radius will be the distance from any point on the circle to the center, so we can compute the radius by finding the distance from P to the center. Therefore, the radius is $\sqrt{(1-2)^2 + (4-1)^2} = \sqrt{1+9} = \sqrt{10}$. Note that we can also get the radius by finding the distance from Q to the center.

Method 2: The radius of the circle will be *half of* the distance from one endpoint of the diameter to the other, so we can use the distance formula with P and Q and then take half of the result. Therefore the radius is $\frac{1}{2}\sqrt{(-2-4)^2 + (3-1)^2} = \frac{1}{2}\sqrt{36+4} = \frac{\sqrt{40}}{2} = \frac{2\sqrt{10}}{2} = \sqrt{10}$.

Problem 3 (3 points): *Solve the following equation*

$$y - [2 - (y - 1)] = 3$$

Solution: We proceed by first simplifying the equation, then solving

$$\begin{aligned} y - [2 - (y - 1)] &= 3 \\ y - [2 - y + 1] &= 3 \\ y - [3 - y] &= 3 \\ y - 3 + y &= 3 \\ 2y - 3 &= 3 \\ 2y &= 6 \\ y &= 3 \end{aligned}$$

Problem 4 (1 point): *Saying that* $\frac{2a+b}{2} = a + b$ *is (circle one:)*

CORRECT *A VITAL ERROR*

Solution: The above operation is a **VITAL ERROR**. When looking for common terms in a fraction to cancel, remember that we cannot cancel terms that appear in a sum or difference in the numerator.