

For this problem, we are going to be using the above code to recreate some of the mathematics behind the Introduction to Bayesian Statistics lecture. The math has already been worked out for you, so you will only have to manipulate code, but if you are curious of the math behind the update for the mean of a distribution, you can look here: [https://en.wikipedia.org/wiki/Conjugate\\_prior](https://en.wikipedia.org/wiki/Conjugate_prior). The math for this problem is located under the continuous distributions section where our model parameter is  $\mu$  and we have a known variance  $\sigma^2$

Before we get started, we need to get some values.

First, what is the mean of the prior that we are using?

100

✓ **Correct**

We can see that 100 is the value assigned to `prior_mean`

2. What is the standard deviation of the prior?

1 / 1 point

10

✓ **Correct**

This is the value that is assigned to `prior_sigma`

3. Let's say that we observe a person with an IQ of 125, as we did in the lecture. Which way should the posterior distribution, after our Bayesian update, shift?

1 / 1 point

- ☐ Left
- ☒ Right
- ☐ Stay the Same



**Correct**

That's right, the posterior should shift right to account for seeing data that was larger than the mean that my prior had

4. Now, let's say that I observe two more people and I see that they also have IQs of 110. So we have three people with IQs of 110. How does the variance of my estimate change from my prior? We can do this in the code by setting:

1 / 1 point

```
new_data = [110, 110, 110]
```

- ☒ The variance decreases
- ☐ The variance increases
- ☐ The variance stays the same



**Correct**

The variance should decrease. If we run the code, we can see that the width of the distribution decreases indicating the variance of the estimate also decreased

5. What is the posterior mean after observing three people with an IQ of 110 in a row?

1 / 1 point

109.7087378640



**Correct**

The correct answer is: 109.7087378640. We can get this answer by running the code and looking at the `posterior_mean` variable

6. If I observe now five people: the first three have an IQ of 110, and the last two have an IQ of 125, which of the following are true?

1 / 1 point

- ☐ The posterior mean is the average of 110, 110, 110, 125, and 125
- ☐ The posterior mean is equal to 110
- ☐ The posterior mean is equal to 100
- ☐ The posterior mean is equal to 125
- ☒ The posterior mean is equal to 115.717

✓ **Correct**

This is correct and what you would get if you ran the code

- ☐ The posterior standard deviation is the same as the prior standard deviation
- ☐ The posterior standard deviation is greater than the prior standard deviation
- ☒ The posterior standard deviation is less than the prior standard deviation

✓ **Correct**

Correct!

- ☐ The posterior standard deviation is equal to 10
- ☒ The posterior standard deviation is equal to 1.768

✓ **Correct**

This is correct

- ☐ The posterior standard deviation is equal to 3