Problem:

The official schedule of the college allots 75 minutes for teaching in class. The actual time a professor actually stands before the class to teach however is a random variable. A Statistics professor sometimes dismisses the class early and sometimes goes a little over the allotted time. The professor teaches between 68 and 80 minutes with any specific time within that range equally likely to occur.

1.What distribution that can be used to describe the teaching time.

2.What is the equally likely probability for any teaching time for this professor?

3.What is the expected teaching time?

4.What is the standard deviation of the teaching time

5.What is the probability this professor will teach for up to 78 minutes?

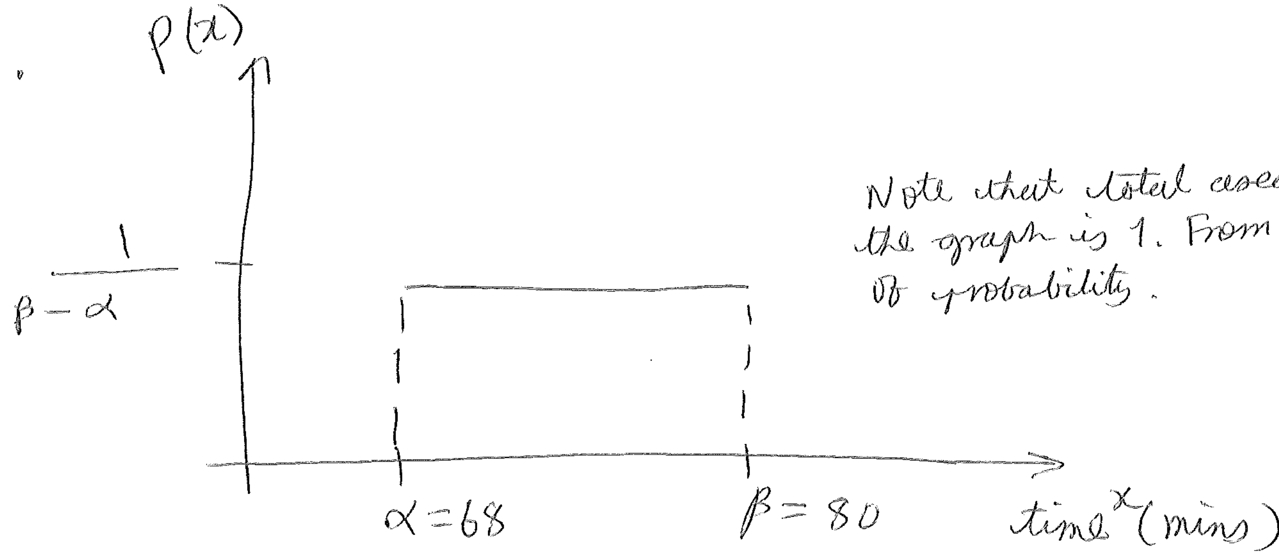
6.What is the probability the professor will teach for between 73 and 76 minutes.

7.What teaching time is associated with a probability of 90% (aka the 90^{th} percentile teaching time)?

1. 'Equally likely' implies Uniform distribution

2.

Note that total area under the graph is 1. From axiom of probability.



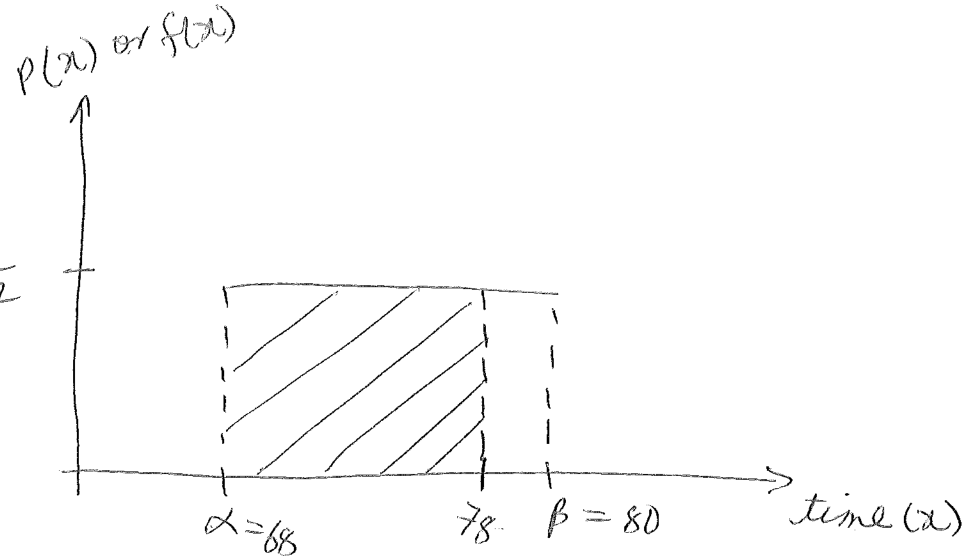
$$\frac{1}{\beta-\alpha} = \frac{1}{80-68} = \frac{1}{12} = 0.0833$$

3. Expectation $\mu = \frac{\alpha+\beta}{2} = \frac{68+80}{2} = 74$ mins

4. $s = \sqrt{\frac{1}{12}(\beta-\alpha)^2} = \sqrt{\frac{1}{12}(80-68)^2} = 3.46$ mins

5.

5.



so we need area under curve up to 78.

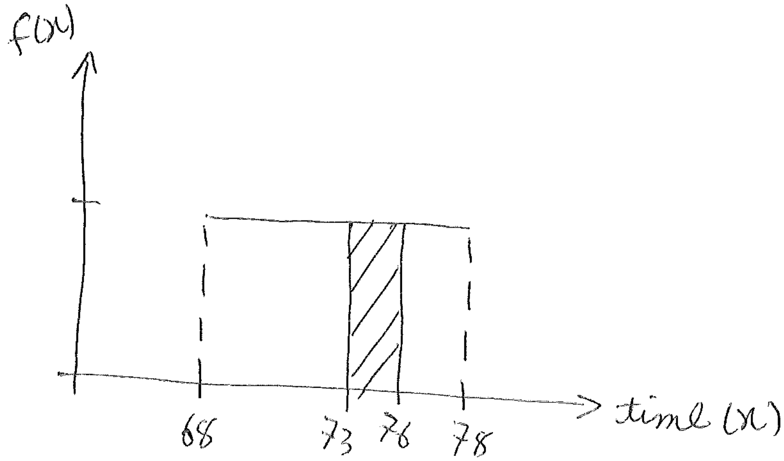
This is coming from property

$$P(X \le x) = \int_{-\infty}^{x} f(x)\,dx$$

so,

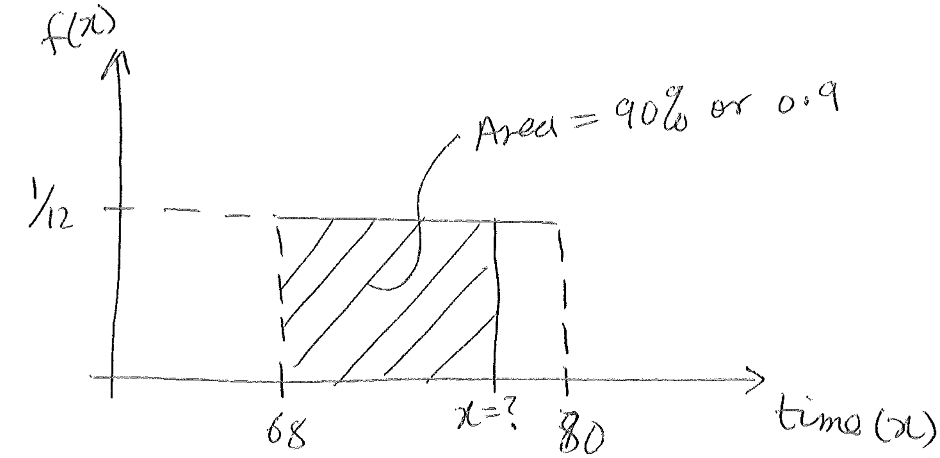
$$P(X \le 78) = (78-68) \cdot \frac{1}{12} = 0.833 \quad \text{or } 83.33\%$$

6.



$$P(73 \le x \le 76) = (76 - 73) \cdot \frac{1}{12} = 0.25$$

7.



so we can use interpolation, proportionate share etc.

$$(x - 68) \cdot \frac{1}{12} = 0.90$$

$$x = 12(0.90) + 68 = 78.8 \text{ minutes.}$$