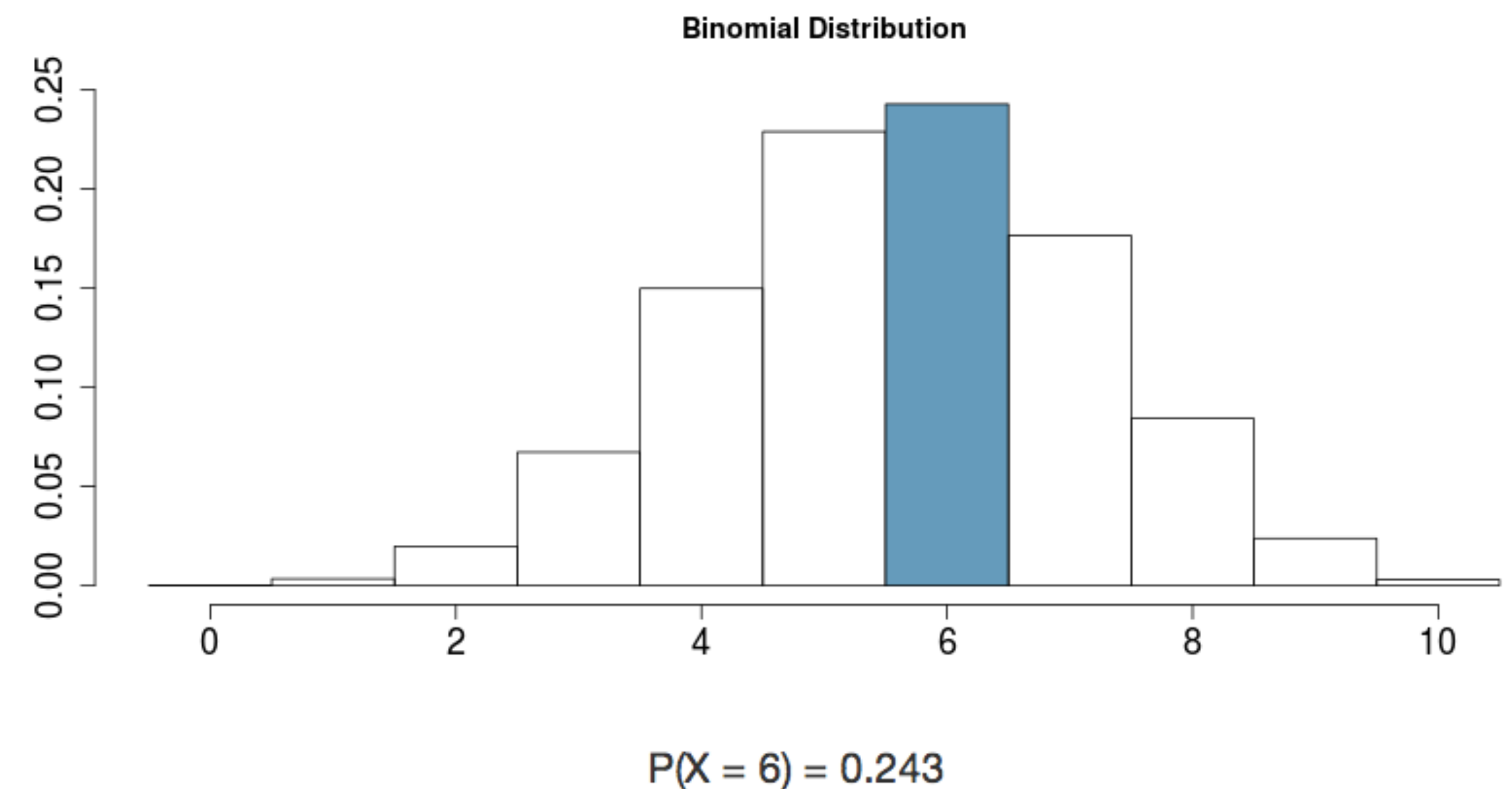
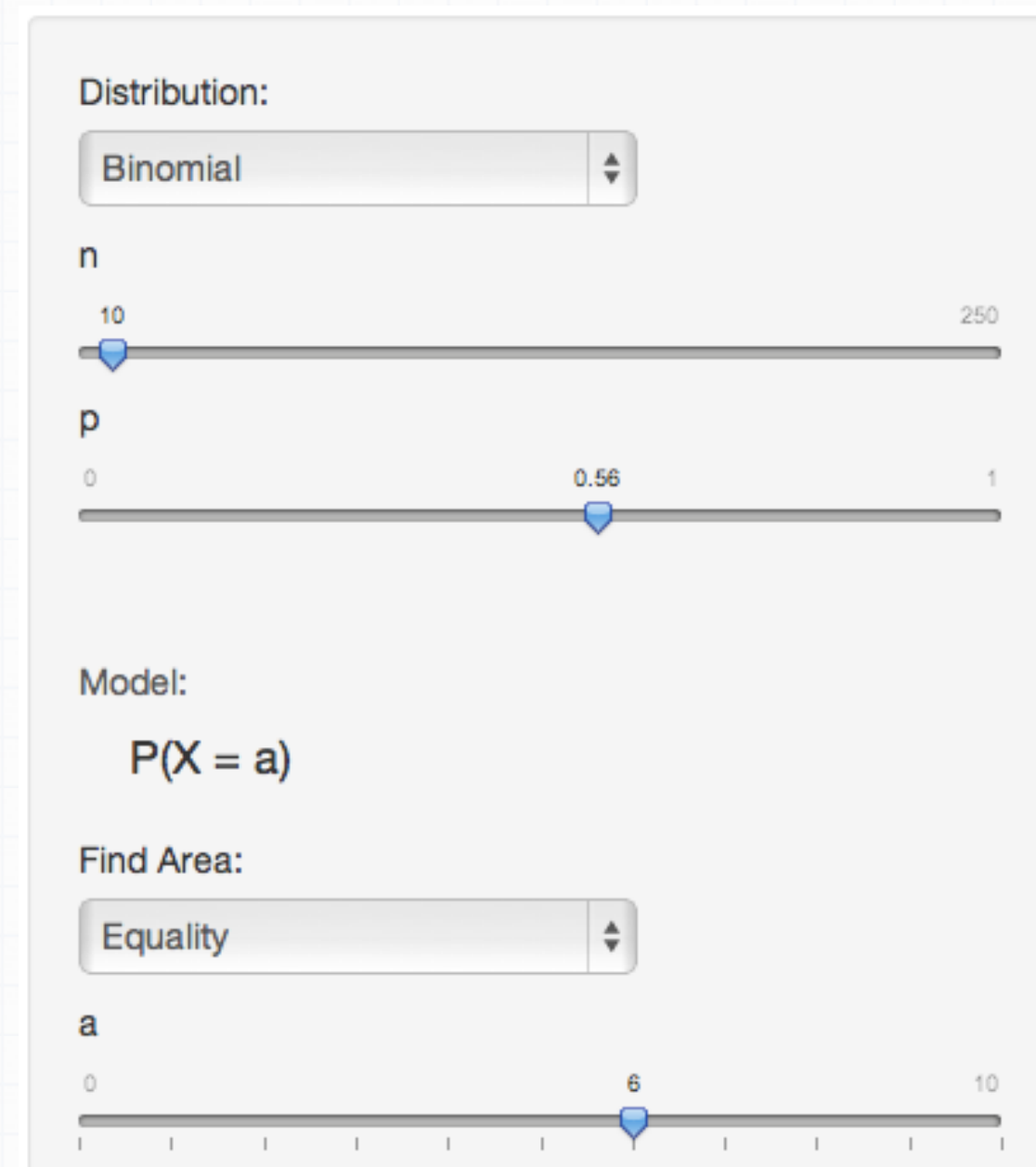


examples

working with
the binomial
distribution

According to a 2014 Gallup poll, 56% of uninsured Americans who plan to get health insurance say they will do so through a government health insurance exchange. What is the probability that in a random sample of 10 people exactly 6 plan to get health insurance through a government health insurance exchange?

http://bit.ly/dist_calc



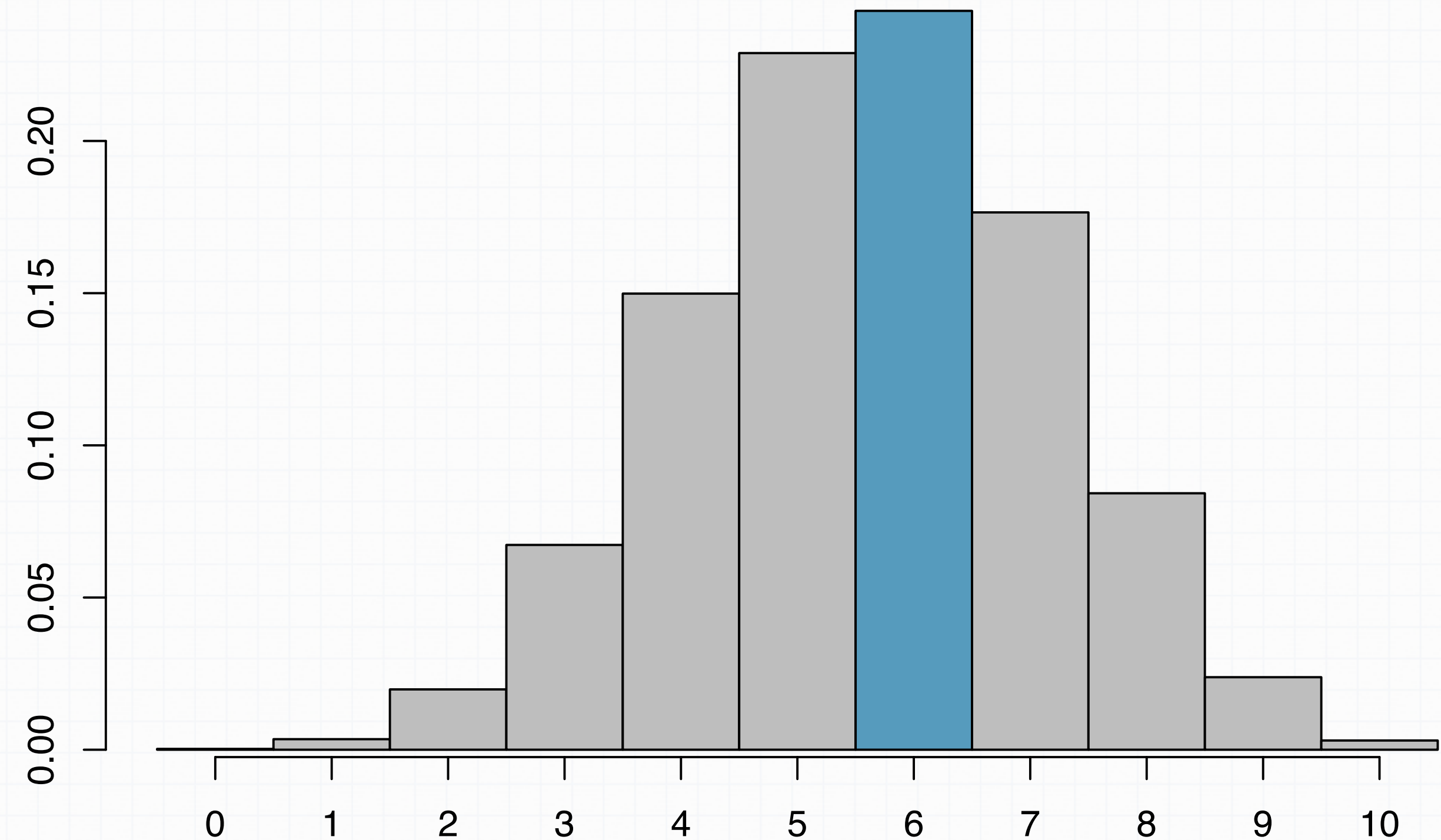
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R

```
> dbinom(6, size = 10, p = 0.56)  
[1] 0.243
```

According to a 2014 Gallup poll, 56% of uninsured Americans who plan to get health insurance say they will do so through a government health insurance exchange. What is the probability that in a random sample of 10 people exactly 6 plan to get health insurance through a government health insurance exchange?

$$\begin{aligned} P(X = 6) &= \binom{10}{6} 0.56^6 \times 0.44^4 \\ &= \frac{10 \times 9 \times 8 \times 7 \times 6!}{6! \times 4 \times 3 \times 2 \times 1} \times 0.56^6 \times 0.44^4 \\ &= 210 \times 0.56^6 \times 0.44^4 \\ &= 0.243 \end{aligned}$$



What is the probability that in a random sample of 1000 people exactly 600 plan to get health insurance through a government health insurance exchange?

- (a) 0.243, same as $P(K = 6)$
- (b) less than 0.243
- (c) more than 0.243

$$p = 0.56$$

$$n_1 = 10 \quad \mu_1 = 10 \times 0.56 = 5.6$$

$$\Delta = 6 - 5.6 = 0.4$$

$$n_2 = 1000 \quad \mu_2 = 1000 \times 0.56 = 560$$

$$\Delta = 600 - 560 = 40$$

R

```
> dbinom(600, 1000, 0.56)
[1] 0.00098
```

Describe the probability distribution of number of uninsured Americans who plan to get health insurance through a government health insurance exchange among a random sample of 100.

$$p = 0.56 \quad n = 100$$

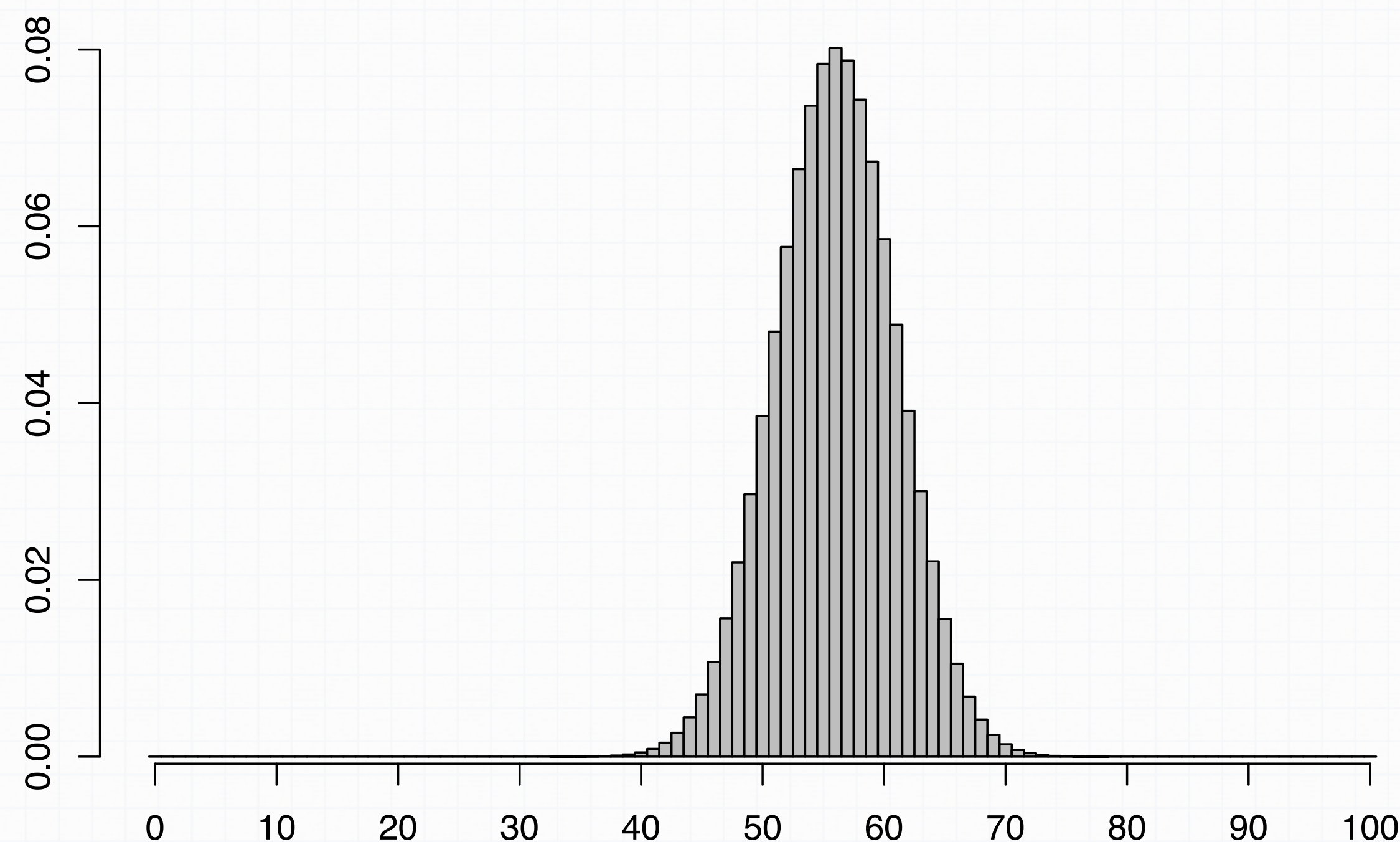
$$\# \text{ suc: } np = 100 \times 0.56 = 56 > 10$$

$$\# \text{ fail: } n(1-p) = 100 \times 0.44 = 44 > 10$$

$$\mu = 56$$

$$\sigma = \sqrt{100 \times 0.56 \times 0.44} = 4.96$$

$$N(\text{mean} = 56, SD = 4.96)$$



What is the probability that at least 60 out of a random sample of 100 uninsured Americans plan to get health insurance through a government health insurance exchange?

Distribution:
Binomial

n
1 100 250

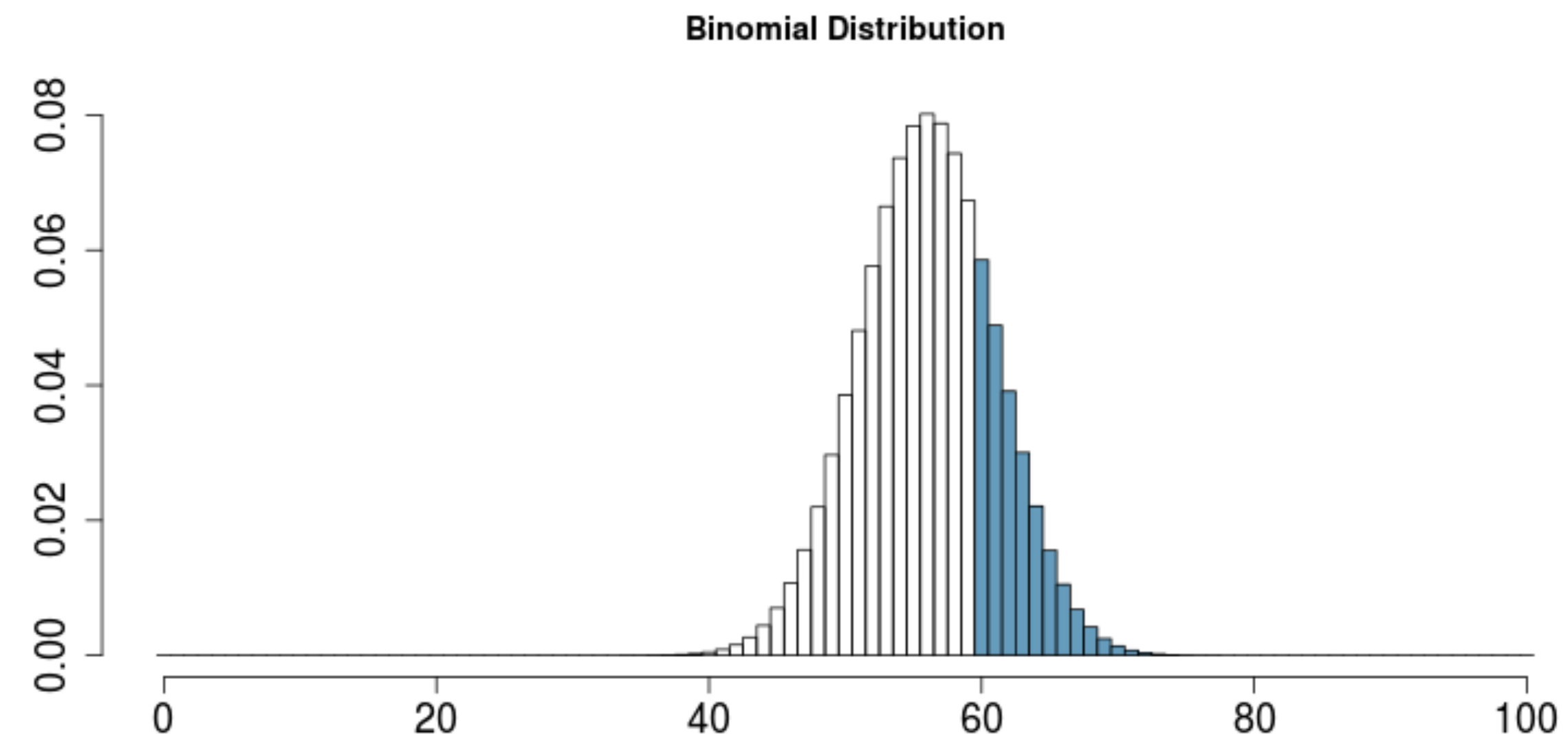
p
0 0.56 1

Model:
 $P(X \geq a)$

Find Area:
Upper Tail

Bound:
 \geq

a
0 60 100



$$P(X \geq 60) = 0.241$$

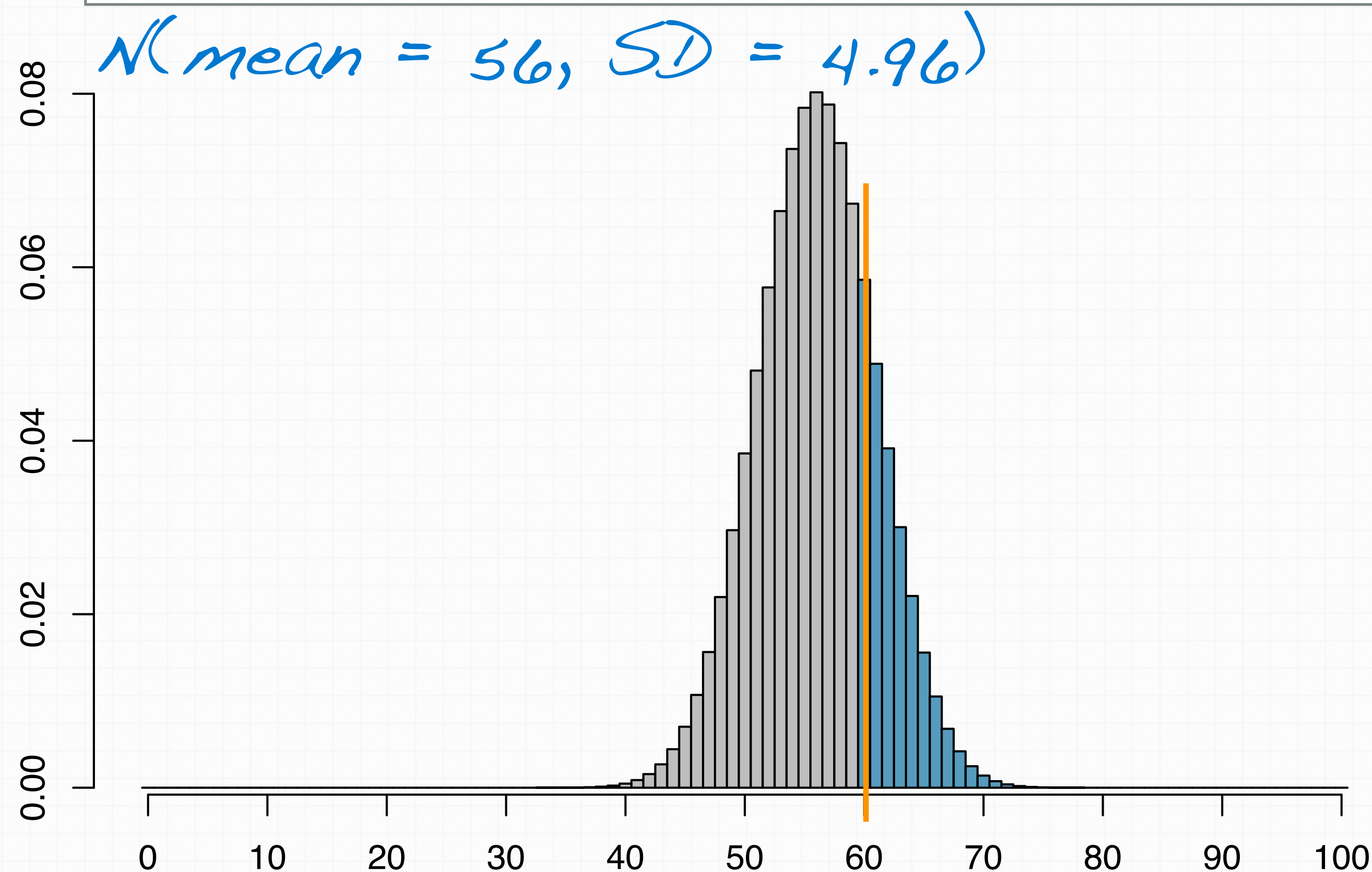
http://bit.ly/dist_calc

What is the probability that at least 60 out of a random sample of 100 uninsured Americans plan to get health insurance through a government health insurance exchange?

R

```
> sum(dbinom(60:100, size = 100, p = 0.56))  
[1] 0.241
```


What is the probability that at least 60 out of a random sample of 100 uninsured Americans plan to get health insurance through a government health insurance exchange?



$$Z = \frac{60 - 56}{4.96} \approx 0.81$$

$$P(Z > 0.81) = 0.209$$

$$Z = \frac{59.5 - 56}{4.96} \approx 0.71$$

$$P(Z > 0.71) = 0.239$$