

Authors
CS 109

Handout #1
March 13–20, 2021

Take-Home Quiz

Take-Home Quiz information

Exam # 00000

Here are directions for how to use this LaTeX-generated document:

- Some information here

Name (typed or written): _____

Student ID: _____

1 Video Views: Binomial Approximation [10 points]

We are studying a video streaming platform. We define a viewer for a particular video as a user who watches the video in entirety. Let the number of viewers for each video be distributed as a Binomial random variable $\text{Bin}(n, p)$, where n is the initial number of viewers and p is the probability that each initial viewer watches the entire video.

Suppose that the number of viewers for a popular video A is distributed as $\text{Bin}(200, 0.4)$. Furthermore, suppose that the number of viewers for a not-so-popular video B is distributed as $\text{Bin}(100, 0.15)$. What is the **approximate** probability that the number of viewers for video A is **more than twice** the number of viewers for video B ?

In addition to providing justification above,
please compute a numeric answer:

2 Jointly Continuous Random Variables [10 points]

X and Y are jointly continuous random variables with the following joint PDF:

$$f_{X,Y}(x, y) = c(2x^2 + 2y) \quad 0 \leq x \leq 1 \text{ and } 0 \leq y \leq 1 \quad (1)$$

Note that $f_{X,Y}(x, y)$ is a valid PDF if the constant $c = 3/5$. What is $E[Y]$? Provide a numeric answer (fractions are fine).

In addition to providing justification above,
please compute a numeric answer:

3 Mystery Code [10 points]

```
unsigned char mystery(unsigned char n) {  
    n |= n >> 1;  
    n |= n >> 1;  
    n |= n >> 2;  
    n++;  
    return (n >> 1);  
}
```

What does the following code print out?

```
printf("%u", mystery(88));
```

That's the end of this quiz!