

## *Stat 134: Section*

*Brett Kolesnik*

*April 5, 2020*

### *Conceptual Review*

Please discuss these short questions with those around you in section. These problems are intended to highlight concepts that will be relevant for today's problems.

- a. For a normal variable with mean  $\mu$  and variance  $\sigma^2$ , verify that its mean and variance are  $\mu$  and  $\sigma^2$ .
- b. What are the mean and variance of the sum of independent variables?
- c. What is the Chi-squared variable? What is its degree of freedom?

### *Problem 1*

Let  $X, Y$  be independent normal variables,  $X$  with mean 0 and variance 1,  $Y$  with mean 1. Suppose  $P(X > Y) = 1/3$ . Find the standard deviation of  $Y$ .

*Ex 5.3.5 in Pitman's Probability*

*Problem 2*

Let  $X, Y$  be independent standard normals. Find:

- (a)  $P(|\min(X, Y)| < 1)$ ; (b)  $P(\min(X, Y) > \max(X, Y) - 1)$ .

*Ex 5.3.6 in Pitman's Probability*

*Problem 3*

If  $X$  has normal  $(0, \sigma^2)$  distribution, then  $X^2$  has gamma  $\left(\frac{1}{2}, \frac{1}{2\sigma^2}\right)$ .

*Ex 5.3.15 in Pitman's Probability*