

On the front of your bluebook, write (1) **your name**, (2) **Exam 2**, (3) **APPM 3570/STAT 3100**. Correct answers with no supporting work may receive little or no credit. Books, notes and electronic devices of any kind are not allowed. Your exam should be uploaded to Gradescope in a PDF format (Recommended: **Genius Scan**, **Scannable** or **CamScanner** for iOS/Android). **Show all work, justify your answers. Do all problems.** Students are required to re-write the **honor code statement** in the box below on the **rst page** of their exam submission and **sign and date it**:

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On my honor, as a University of Colorado Boulder student, I have neither given nor received unauthorized assistance on this work. Signature: \_\_\_\_\_ Date: \_\_\_\_\_

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3. [Exam02] (28pts) Suppose that  $X$  and  $Y$  are *jointly distributed random variables* with *joint probability density function* given by

$$f(x; y) = \begin{cases} \frac{8}{5}(2x + 3y); & \text{if } 0 < x < 1; 0 < y < 1, \\ 0; & \text{otherwise.} \end{cases}$$

- (a) (7pts) Set-up, but *do not solve* an integral (or integrals) to find  $P(X < \frac{1}{2}; Y > \frac{1}{3})$ .
- (b) (7pts) Find the  $f_X(x)$ , *marginal probability density function* of  $X$ . (Be sure to define the pdf for all real numbers.)
- (c) (7pts) Find the expectation  $E[X]$ .
- (d) (7pts) Set-up, but *do not solve* an integral (or integrals) to find  $P(XY < \frac{1}{4})$ .

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