APPM 2350—Exam 2

Wednesday Oct 20th, 6:30pm-8pm 2021

This exam has 4 problems. Please start each new problem at the top of a new page in your blue book. Show all your work in your blue book and simplify your answers. Answers with no justification will receive no points. You are allowed one 8.5×11-in page of notes (ONE side). NO calculators, smartphones/watches, or

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Problem 4 (15 points)

Let $G(x; y)$ be a continuous function with continuous partial derivatives such that

$$G(1; 0) = \quad 23; \quad \frac{@G}{@x}(1; 0) = \quad 2; \quad \frac{@G}{@y}(1; 0) = \quad 5; \quad \frac{@^2G}{@x^2}(1; 0) = 4; \quad \frac{@^2G}{@y^2}(1; 0) = 8;$$

$$\frac{@^2G}{@x@y}(1; 0) = \frac{@^2G}{@y@x}(1; 0) = \quad 3;$$

(a) Given this information, find a 2nd order (i.e. quadratic) Taylor approximation of $G(x; y)$ and use it to approximate the value of $G(3; \quad 1)$.

(b) Suppose $\frac{@^3G}{@x^3} < \frac{1}{4}, \qquad \frac{@^3G}{@y^3} < \frac{1}{4}, \qquad \frac{@^3G}{@x@y^2} < \frac{1}{4}$