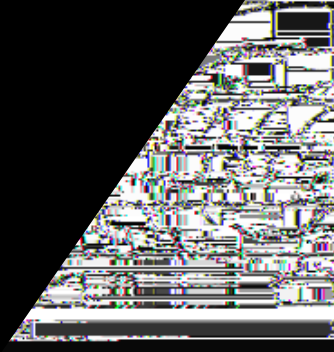


APPM 2350 Final Exam  
Saturday, Dec 11th 7:30am-10am 2021

Show all your work and simplify your answers. Answers with no justification will receive no points. You may use a calculator, smartphone, smartwatch, or any other device.

Answer the following questions. You can use any method you wish, including derivatives.



(9, 16) TJ/F53 10.9091

Use the function  $f(x, y)$  (no credit will be given). Use ONLY the gradient to answer the following questions:  
1. Estimate the maximum value of  $f$  at the point  $(9, 16)$  by justifying your estimate.  
2. Find the direction of steepest descent of  $f$  at the point  $(9, 16)$  in the direction  $3i + 4j$ . For credit, show work justifying or explaining your answer.

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Problem 3(25 points)

A metal plate lies in the  $xy$ -plane in the region  $x = 4 - y^2$   
(i.e the region in quadrants I and IV bounded by the