

WRITTEN ASSIGNMENT 6

Hand in full solutions to the questions below. Make sure you justify all your work and include complete arguments and explanations. Your answers must be clear and neatly written, as well as legible (no tiny drawings or micro-handwriting please!). Your answers must be stapled, with your name and student number at the top of each page.

1. Last term, part of Assignment 4 consisted in reworking questions from your midterm exam. You will complete a similar task in this assignment.

(a) Review your December exam (exams were returned in class, talk to your instructor if you haven't picked up your exam yet). Submit full solutions to Question 1a, 3, 4c, 5, 8.

Your solutions should include explanations of the key points and concepts, as well as calculations. Imagine the reader is a fellow student in your class who doesn't know how to answer the problem and needs detailed explanations on the concepts and techniques needed to tackle the problem in question.

(b) Select the two questions you scored the least on the exam. Copy your original answer from the exam or attach a copy of your exam work. Explain where your original reasoning was incorrect, state the correct reasoning for the problem, and how it leads to the right answer. If the two questions you scored the least are any of the ones listed in part (a), you don't need to repeat the solution, just discuss your errors.

2. Show, using implicit differentiation, that any tangent line at a point P to a circle with centre the origin O is perpendicular to the radius OP . *Hint:* Find the slope of the tangent line to the circle at a point $P(x, y)$. Next find the slope of the line that goes the point P and the origin.
3. If f and g are twice-differentiable functions, show that

$$(fg)'' = f''g + 2f'g' + fg''$$