

MA 1201 Semester B 2018/19

Assignment 2 — Due at 5 pm, 21/3/2019 (Thursday) in tutorial classes

Instructions:

- Please show your work. Unsupported answers will receive **NO** credits.
 - Make sure you write down the correct lecture session (A/B/C/D/E/F/G/H) you have registered for, together with your full name and student ID on the front page of your answer script. Hand your solution to your TA in tutorial class before the deadline.
 - In case your tutorial class is scheduled on days other than Thursday, you may choose to hand your solution to your TA in one of the tutorial classes scheduled on Thursday.
 - **NO** late homework will be accepted. Homework submitted to wrong tutorial sessions will **NOT** be graded and will receive **0 POINTS**.
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1. (50 points) Evaluate the following integrals.

(a) (10 points) $\int (\sin^{-1} x)^2 dx$.

(b) (10 points) $\int \sin 3x \cos^2 2x dx$.

(c) (15 points) $\int_0^{\ln \sqrt{3}} \frac{e^{6x}}{\sqrt{9 - e^{4x}}} dx$.

(d) (15 points) $\int \frac{x^3 - 5x^2 + 14x - 7}{x^2 - 4x + 9} dx$.

2. (15 points) Find the volume of the solid generated by revolving the region bounded by the curves $x = 3y^2 - 2$, $x = y^2$ in the *upper* half plane

- (a) (5 points) about the line $y = -1$, using the washer method (see page 157–164 of the supplementary notes for a description of the washer method).
 - (b) (5 points) about the line $y = -1$, using the shell method (see page 165–176 of the supplementary notes for a description of the shell method).
 - (c) (5 points) about the line $x = -4$, using any appropriate method.
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3. (20 points) The region bounded by the curve $y = \sin x$ and the lines $x = 0$, $x = \pi$, $y = c$ ($0 \leq c \leq 1$) is revolved about the line $y = c$ to generate a solid.

- (a) (10 points) Find the value of c that minimizes the volume of the solid. What is the minimum volume?
- (b) (5 points) What value of c in $[0, 1]$ maximizes the volume of the solid?

Session:

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Student ID:

- (c) (5 points) Graph the solid's volume as a function of c , first for $0 \leq c \leq 1$ and then on a larger domain. What happens to the volume of the solid as c moves away from $[0, 1]$? Does this make sense physically? Give reasons for your answers.
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4. (15 points) Find the length of the curve $x = (y^3/12) + (1/y)$, $1 \leq y \leq 2$.

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