MA 1201 Semester B 2019/20

Midterm Exam (A/B/C/D, 100 mins)

Instructions:

- Please show your work. Unsupported answers will receive **NO** credits.

- Make sure you write down the correct lecture session (A/B/C/D) you have registered for, together with your full name and student ID on the front page of your answer script.

- Exams submitted to wrong lecture sessions will **NOT** be graded and will receive **0 POINTS**.

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1. (25 points) Let $A(-1,2,1)$, $B(2,3,-1)$, and $C(0,-1,3)$ be three points in $\mathbb{R}^3$. Using vector method:

   (a) (8 points) Find the area of the triangle $\triangle ABC$.

   (b) (8 points) Find the equation of the plane that contains A, B, and C.

   (c) (9 points) Find the distance from C to the line passing through A and B.

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2. (50 points) Evaluate the following integrals.

   (a) (7 points) $\displaystyle\int \frac{1}{1+16x^2}\,dx$.

   (b) (8 points) $\displaystyle\int_{-\pi}^{\pi} |\sin x|\,dx$.

   (c) (10 points) $\displaystyle\int \sin(2x)\ln(\sin x)\,dx$.

   (d) (10 points) $\displaystyle\int \frac{x^2}{(4-x^2)^{3/2}}\,dx$.

   (e) (15 points) $\displaystyle\int \frac{7x+22}{(x+2)(x^2+4x+8)}\,dx$.

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3. (25 points)

   (a) (15 points) Find the volume of the solid generated by revolving the region in the first quadrant bounded from above by $y = e^{x/2}$, from below by $y = e^{-x/2}$, and on the right by $x = 2$ about the y-axis.

   (b) (10 points) Find the length of the curve $y = \ln(\sec x)$, $0 \leq x \leq \pi/4$.

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