Session: **Name:** **Student ID:**

MA 1201 Semester B 2019/20

Midterm Exam (E/F/G/H, 100 mins)

Instructions:

- Please show your work. Unsupported answers will receive **NO** credits.
- Make sure you write down the correct lecture session (E/F/G/H) 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 angle $\angle ABC$.

   (b) (9 points) Find the equation of the plane that contains A, B, and C.

   (c) (8 points) Find the distance from $D(1,0,-2)$ to the plane containing A, B, and C.

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2. (50 points) Evaluate the following integrals.

   (a) (7 points) $\displaystyle\int \tan(3x+1)\,dx$.

   (b) (8 points) $\displaystyle\int_0^2 \mathrm{e}^{1+|x-1|}\,dx$.

   (c) (10 points) $\displaystyle\int \mathrm{e}^{2x}\sin(2\mathrm{e}^x+1)\,dx$.

   (d) (10 points) $\displaystyle\int \frac{1}{(x^2-4)^{3/2}}\,dx$.

   (e) (15 points) $\displaystyle\int \frac{11x+29}{(x-1)(x^2+6x+13)}\,dx$.

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3. (25 points)

   (a) (12 points) Find the volume of the solid generated by revolving the region in the first quadrant bounded from above by $y=\mathrm{e}^{x/2}$, from below by $y=\mathrm{e}^{-x/2}$, and on the right by $x=2$ about the x-axis.

   (b) (13 points) Find the length of the curve $x(t)=at^2$, $y(t)=2at$, $0\le t\le a$ where $a>0$ is a constant.

— THE END —