NTU 108-1 MATH4007 CALCULUS 2 MODULE-07 QUIZ 4 19TH DECEMBER, 2019

Work out **ALL** questions below. Provide sufficient justification to every step of your arguments. Write your solutions as well as your ID number clearly on the answer sheet.

Time: 17:50 $\sim$ 18:20

DEPARTMENT:_____ ID NUMBER:_____ NAME:_____

1. Evaluate the following integrals.

   (a) (15 pts) $\int 2x \arctan x \, dx$.

   (b) (20 pts) $\int_0^{\frac{\pi}{2}} \left|\cos^2 x - 3\sin^2 x\right| \, dx$.

   (c) (30 pts) $\int \frac{1}{e^{2x}+e^x+1} \, dx$. [Hint: Let $t = e^x$.]

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2. Determine whether the following improper integrals are convergent or divergent. If convergent, please determine its value.

   (a) (17 pts) $\int_0^1 \frac{\cos t}{t^{4/3}}\, dt$.

   (b) (18 pts) $\int_1^\infty \frac{\arctan x}{x^2}\, dx$.

The End.