

★ Answer and mark clearly the questions in the provided answer sheets.
Write down your name and student's ID on the each answer sheet you used.
* **Note:** No points will be given if no arguments are provided for an answer.

For your information:

- $\int \sin u \, du = -\cos u + C$
- $\int \cos u \, du = \sin u + C$
- $\int \sec^2 u \, du = \tan u + C$
- $\int \sec u \tan u \, du = \sec u + C$
- $\sin^2 u + \cos^2 u = 1$ and $\tan^2 u + 1 = \sec^2 u$

Good Luck!

~~ Yes ☺

1. (60 points) Find

$$(a) \int \frac{2e^x}{1+e^x} dx \quad (b) \int \frac{x+1}{\sqrt{x}-1} dx \quad (c) \int \left(xe^{x^2} - \frac{x}{x^2+2} \right) dx$$

$$(d) \int \frac{3e^{2x}}{(1+3e^x)^2} dx \quad (e) \int \frac{1}{(9-x^2)^{3/2}} dx \quad (f) \int (\ln x)^3 dx$$

2. (20 points) Solve the differential equations:

$$(a) y' = \frac{y \ln x}{x} \quad (b) y' = xy e^x; y(1) = 1$$

3. (20 points) Find

$$(a) \int \sin(\ln x) dx \quad (b) \int \sec(\pi x) dx$$