

Final Exam.

Make Up.

Math 3350

① Solve the following 1st order equation.

$$\frac{dy}{dt} + ay = \frac{e^{-at}}{t+1}$$

where $y(0) = 5$ and a is a constant.

② Solve the following 2nd order equation:

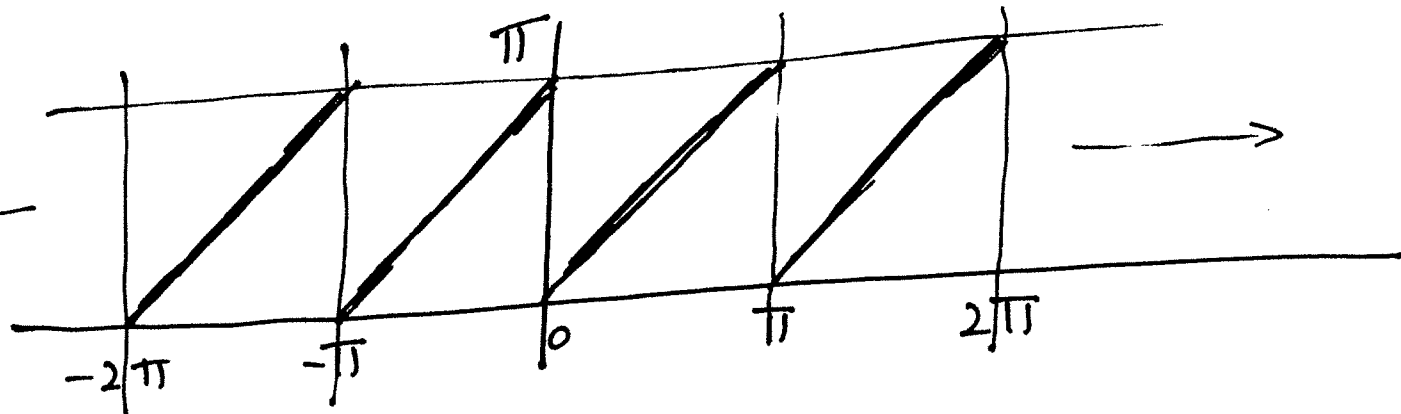
$$\frac{d^2 y}{dt^2} + 3 \frac{dy}{dt} + 2y = \sin 5t$$

where $y(0) = 0, \dot{y}(0) = 1$

③ A periodic function $f(x)$ of period π (not 2π) is defined in the interval $(0, \pi)$ as follows:

$$f(x) = x \quad \text{for } 0 < x < \pi$$

The function has a graph as shown



- ① Calculate the Fourier Series Expansion of $f(x)$.
- ② What is the value of the Fourier series at $x = 0$.

Hint for Q-3

Define a function

$$g(x) = f(x) - \frac{\pi}{2}$$

Show that $g(x)$ is odd $\neq 4$
by sketching its graph.

Calculate the Fourier
series expansion of $g(x)$.

Hence calculate the Fourier
series expansion of $f(x)$