INC 212 Signals and Systems **Online Home Exam**
Assign: 29 May 2020 **10.00-12.00 am**

Instruction: This is an online exam.
Member:

1. Name:_____Code:_____

Questions: Your answer sheet is a Microsoft word file which has `s+studentID.docx` as your file name. You also ask to work on a sheet of paper to show your solutions. The later can submit in any form

1 Download two files, namely `exam_2020.mat` and `fourier_p2exam.m`, and do the following tasks:

(a) run `fourier_p2exam.m` on your Matlab workspace and see the results.

(b) From the plot, you can change the Matlab code or using your hand to find a_3 and b_5, which are two of the Fourier series coefficients. Write down the value of a_3 and b_5 on your answer sheet. (10 points)

2 Find the Fourier Transform of

$$f(t) = 5 + K\sqrt{2}e^{-1}\cos(t - 135^\circ), \tag{1}$$

where K is your last digit number of your student ID. Type your answer in your answer sheet. (10 points)

3 From the Figure 1 Find the transfer function from $x(t)$ to $y_1(t)$ and $x(t)$ to $y_2(t)$. Write

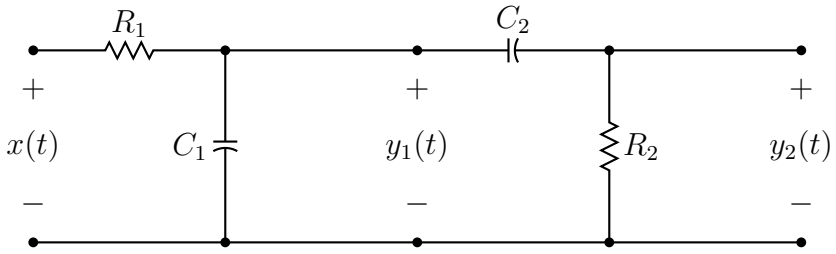

Figure 1: RC circuit

down you answer in your answer sheet. (10 points)

4 Consider a signal

$$x(t) = 5\cos(10\pi t) + \sin(90\pi t)$$

shown in Figure 2. If we consider a part of the signal $x(t)$ that has a frequency lower

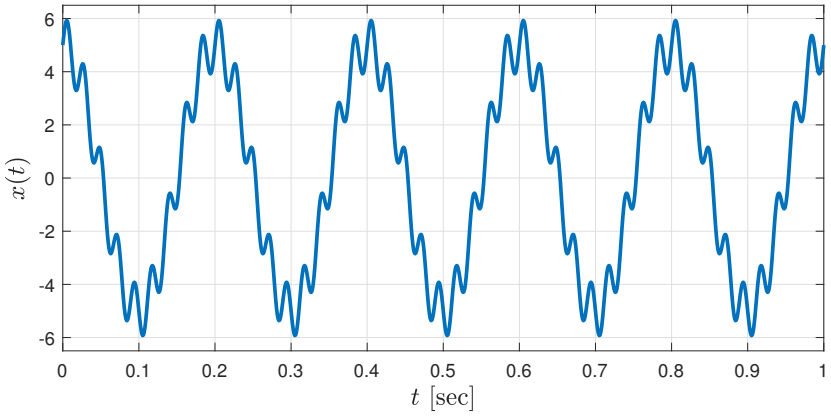

Figure 2: A sinusoidal signal

than 90π rad/sec is a noise. Using a RC circuit to construct a high-pass filter. What is a cut-off frequency? If we select $R = 1$ kΩ, what is your design value of C to extract the signal $y(t) = \sin(90\pi t)$. Write down your answer in the answer sheet. (10 points)