READ BEFORE TAKING ASSESSMENT:

By submitting your assessment to Canvas, you are consenting to take the following pledge:

MATH7021: Spring 2020, 40% Test

Please use paper to carefully write down your answers, carefully labelling parts. You may use a calculator, and the Formula & Tables provided in the Test 1 unit on Canvas.

The assessment runs from 11:00 to 12:30. The assessment is designed to be completed in 48 minutes, and there is a very generous 15 minutes allocated to submitting your work to Canvas. There is an additional 27 minutes grace period due to the remote nature of this assessment. Therefore you have until 12:30 to submit your work on Canvas. You can use the 90 minutes however you want, but no files will be accepted after 12:30.

Carefully take photos of your work (with questions labelled neatly) and submit to Test 1 on Canvas before 12:30.

If possible, submit the images as a single pdf file. To do this, select all the images in a folder, right-click and press print. It will say something like *How do you want to print your pictures?* Press (Microsoft?) Print to PDF. If possible choose an orientation that has all the images in portrait.

If you have a technical issue, you can call me on 086-1089437.

Answer all questions. Marks may be lost if necessary work is not clearly shown.

PLEASE READ ALL QUESTIONS CAREFULLY. QUESTIONS ON NEXT PAGE.

Undetermined Coefficients

If the auxiliary equation to a damped harmonic oscillator has roots $p \pm iq$,
then

$$y_H(t) = e^{pt}(A\cos(qt) + B\sin(qt)).$$

Laplace Transforms Table

The Laplace Transform is defined by

$$F(s) = \mathcal{L}\{f(t)\} := \int_0^\infty f(t)e^{-st}\, dt.$$

$f(t)$	$F(s)$
$A = $ constant	$\dfrac{A}{s}$
t^N	$\dfrac{N!}{s^{N+1}}$
$\dfrac{t^{N-1}}{(N-1)!}$	$\dfrac{1}{s^N}$
e^{-at}	$\dfrac{1}{s+a}$
$\sin(\omega t)$	$\dfrac{\omega}{s^2 + \omega^2}$
$\cos(\omega t)$	$\dfrac{s}{s^2 + \omega^2}$
$f(t)e^{-at}$	$F(s+a)$
$f'(t)$	$s \cdot F(s) - f(0)$
$f''(t)$	$s^2 \cdot F(s) - s \cdot f(0) - f'(0)$