MATH40004/MATH40011 - Calculus and Applications

Midterm – 18 February 2021

Question 1. Obtain the Fourier transform of $f(x) = \sin x \cos^2 x$.
(6 marks)

Question 2. Find the general solution of the following third order linear ODE for $x > 0$.

$$x^3 \frac{d^3y}{dx^3} + x\frac{dy}{dx} - y = 1/x.$$

(7 marks)

Question 3. Consider the following second order homogeneous linear ODE:

$$\frac{d^2x}{dt^2} + 3\frac{dx}{dt} - 4x = 0.$$

Write an equivalent system of first order linear ODEs and obtain its general solution.
(7 marks)