MA1301 **Name:** ____________________

Semester B 2021-22

HW 2

1. Determine if the following integral is convergent or divergent. If it is convergent find its vale.

$$(a) \int_{-\infty}^{+\infty} xe^{-x^2} dx$$

$$(b) \int_{-\infty}^{0} \frac{1}{\sqrt{3-x}} dx$$

$$(c) \int_{0}^{3} \frac{1}{\sqrt{3-x}} dx$$

$$(d) \int_{0}^{+\infty} \frac{1}{x^2} dx$$

2. Compute the following integral using method of partial fraction:

$$(a) \int \frac{2x^2-5x+5}{(x-1)^2(x-2)} dx$$

$$(b) \int \frac{3x^4-5x^3+x^2+2x+1}{3x^3-2x^2-x} dx$$

$$(c) \int \frac{x}{(x+1)(x^2+4x+6)} dx$$

$$(d) \int \frac{3x^3-2x-20}{(x^2+3)(2x^2-6x+5)} dx$$

3. (a) Find the arc length of the curve $y = \frac{1}{3}x^{\frac{3}{2}}$ for $0 \leq x \leq 5$.
   (b) Find the arc length of the curve $(y-1)^3 = \frac{9}{4}x^2$ for $0 \leq x \leq \frac{2}{3}(3)^{\frac{3}{2}}$.
   (c) Find the arc length of the curve parametrized by $(x(t), y(t)) = (\cos t + t\sin t, \sin t - t\cos t)$, $0 \leq t \leq \frac{\pi}{2}$.

4. (a) Find the surface area of the surface generated by rotating the region bounded by the curves $y = x^3$, x-axis, $x = 0$ and $x = 2$ about x-axis for one complete revolution.
   (b) Let R be the region bounded by the four straight lines $y = x$, $x + y = 4$, $y = x - 2$ and $x + y = 2$. Find the surface area of the surface obtained by rotating the region R about x-axis for one complete revolution.