Question 1

QUESTION 4

Simple Familiar
Technology Active
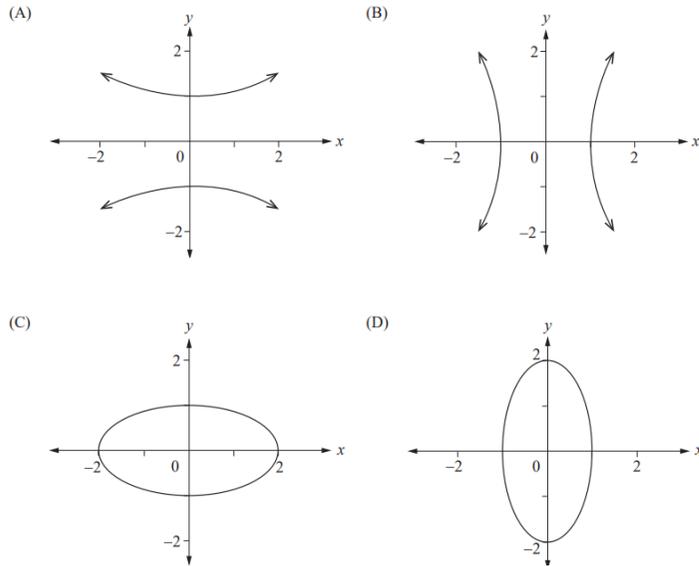2023

The position of a particle can be modelled using $r = \cos(t)\hat{i} - 2\sin(t)\hat{j}$, $t \geq 0$.

Which curve best represents the path of the particle?

(A) (B) (C) (D)

Question 2

QUESTION 7

Simple Familiar
Technology Active
2023

Matrix **N** represents the results for a competition involving four teams.

$$N = \begin{array}{c} \\ \text{Winning teams} \end{array} \begin{array}{cc} & \text{Losing teams} \\ & \begin{array}{cccc} P & Q & R & S \end{array} \\ \begin{array}{c} P \\ Q \\ R \\ S \end{array} & \begin{bmatrix} 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 \end{bmatrix} \end{array}$$

Key: Team P lost to team Q but won against teams R and S.

Using the ranking model $N + 0.5N^2$, the teams that placed first, second and third respectively are

(A) P, S and Q.

(B) P, S and R.

(C) S, P and Q.

(D) S, P and R.

Question 3

QUESTION 17 (6 marks)

Complex Familiar
Technology Active
2023

An object is projected upwards from ground level with an initial velocity of 15 m s^{-1} at an angle of 54° to the horizontal.

The object just passes over a drone hovering in the air. An observer is positioned directly below the drone and at a horizontal distance of 20 m from where the object is projected.

The observer commented that:

• it took the object around 2 to 2.5 seconds after its projection to reach the drone

• the object was still moving in an upwards direction as it passed the drone.

Assuming that air resistance is negligible, use a vector calculus approach to evaluate the reasonableness of the observer's comments.

Message from Joel Speranza

You'll notice there's only 3 questions this week. We're in a funny transition period, where we are starting to run out of Unit 3 questions, and we haven't learnt a lot of Unit 4 content yet.

My plan is to shift to doing less questions for the next few weeks, and then in term 3 we'll start doing slightly more questions. It's all planned out, trust me and we'll get every question done by the time we hit the external (and with time to spare).

My challenge to you:
Go back now and look at week 1 of Project152. Do you think you still know how to do all those questions? Attempt a question you aren't sure of. How did you go? Revisiting questions periodically is an important way to continue to improve.