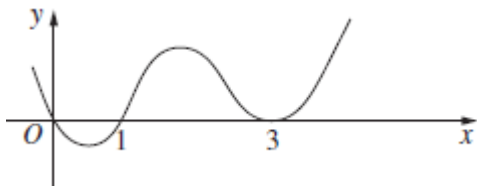
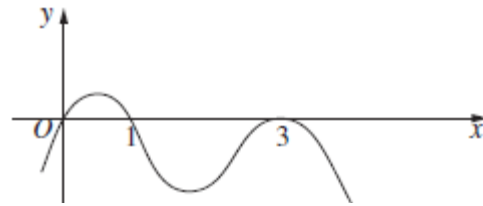
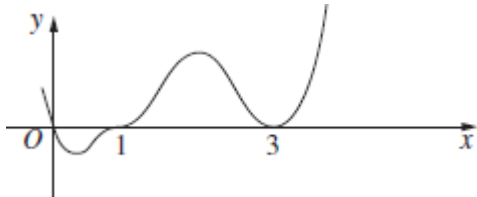


13**4**Which diagram best describe the graph of $y = x(1 - x)^3(3 - x)^2$?**1**

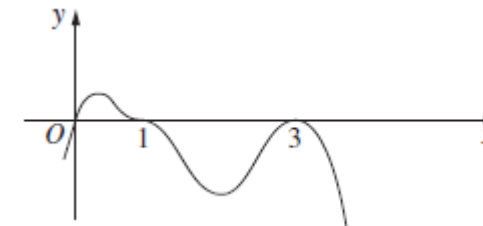
(A)



(B)



(C)



(D)

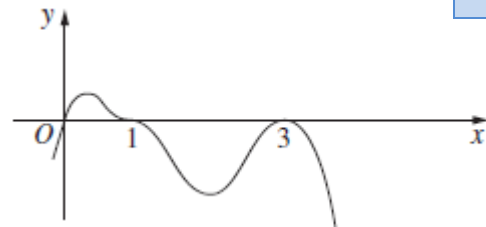
DState Mean:
0.76

$$x(1 - x)^3(3 - x)^2 = 0$$

$$x = 0, 1, 3$$

Consider $x = 4$, $y(4) = 4(1 - 4)^3(3 - 4)^2 = -ve$

Also, 'parabola' at $x = 3$, 'cubic' at $x = 1$



* These solutions have been provided by [projectmaths](http://projectmaths.com.au) and are not supplied or endorsed by the Board of Studies

- (i) A factor of $(x - 3)$ means $P(3) = 0$:

$$P(3) = (3 + 1)(3 - 3)Q(3) + 3a + b = 0$$

$$3a + b = 0 \dots\dots\dots (1)$$
- Also, $P(-1) = 8$:

$$P(-1) = (-1 + 1)(-1 - 3)Q(-1) - a + b = 8$$

$$-a + b = 8 \dots\dots\dots (2)$$
- $(1) - (2)$: $4a = -8$
 $a = -2$
- Subs in (1) : $3(-2) + b = 0$
 $-6 + b = 0$
 $b = 6$
- $\therefore a = -2$ and $b = 6$
- (ii) As $P(x) = (x + 1)(x - 3)Q(x) - 2x + 6$, then the remainder is $-2x + 6$

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Board of Studies: Notes from the Marking Centre

- (i) While many candidates interpreted the information given in the question sufficiently to write a statement like $P(3) = 0$, they did not use this to substitute correctly into the expression for $P(x)$. Some tried to solve convoluted equations.
- (ii) A substantial number of candidates did not attempt this part. Of those who attempted it, many substituted their values of a and b from (i) into $P(x)$ but then attempted either to solve or to divide, indicating that they had not really understood the notion of a polynomial remainder. A few candidates correctly identified the remainder.

Source: http://www.boardofstudies.nsw.edu.au/hsc_exams/