Week - 5

Tutorial

Algebra of polynomials

Mathematics for Data Science - 1

1. Let $p(x)$ and $g(x)$ be quadratic equations having roots -1,+1 and -5,+6 respectively. Which of the following is(are) true?

   A. The degree of polynomial $p(x)g(x)$ is 3.

   B. The degree of polynomial $p(x)g(x)$ is 4

   C. $p(x) + g(x) = 2x^2 - x - 31$

   D. $p(x) + g(x) = 2x^2 + x - 31$

   E. $p(x) - g(x) = x + 31$

   F. $p(x) - g(x) = x + 29$

2. If a polynomial $3x^4 - 8x^3 + 16x^2 - 10$ is divided by another polynomial $x^2 - p$ the remainder comes out to be $-8x - c$ find the value of p and c, where p and c are the constants?

   A. $p = 1$ and $c = -19$

   B. $p = -1$ and $c = 19$

   C. $p = 1$ and $c = -19$

   D. $p = -4/5$ and c cannot be determined.

3. Which of the following polynomials(may also be monomial or constant) should be added to the polynomial $P(x) = 2x^3 + 23x^2 + 40x$ to make it divisible by $x + 9$?

   A. $2x^2 + 9x$

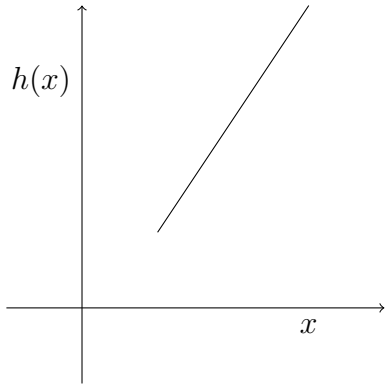
   B. -45

   C. $5x$

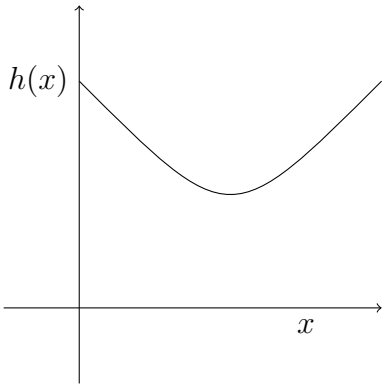
   D. $x^2 - 126$

4. Let $P(x)$, $Q(x)$, and $R(x)$ be the polynomials of degree 2, 3, and 4 respectively. Which are the most suitable (not exact) representation of $h(x)$ where $h(x)$ is known to be a polynomial in x, and if $h(x) = \frac{P(x)Q(x) - Q(x)R(x) + R(x)P(x)}{P(x) + P(x)Q(x)}$?

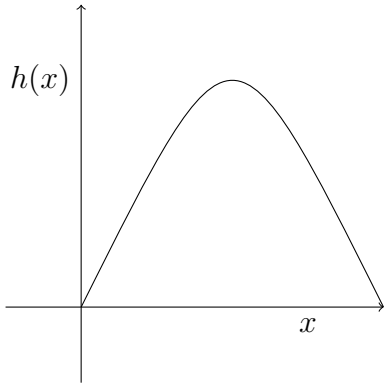
A.



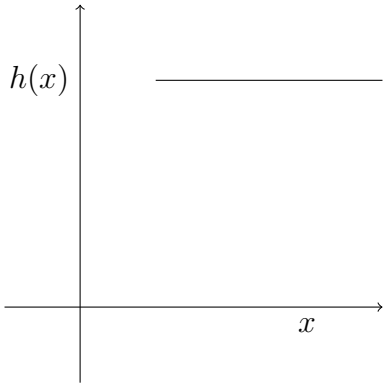
B.



C.



D.



5. Six flat thick iron sheets each of length, breadth, and thickness as $(x+4)$, $(x+3)$, and x respectively are melted to make solid boxes of dimensions $\frac{x}{2}$, $\frac{(2x+6)}{3}$, and $\frac{(x+4)}{5}$. How many solid boxes can be made this way?

6. Let x be the number of years since 2000 (i.e. $x = 0$ denotes the year 2000). The total amount generated (in Lakhs ₹) by selling a product is given by the function $T(x) = 5x^4 + 3x^3 + x^2 + x$. The different costs for that particular year are given in the table. What will the profit be for the particular year?

Cost type	Cost (in Lakhs ₹)
Purchase	$x^4 + x^3 + x^2$
Transportation	$x^3 + x^2 + x$
Miscellaneous	$0.5x^2 + 0.5x$

Table T-6.1

7. A company is planning to produce a product A through three available processes. Cost of production through 1^{st}, 2^{nd} and 3^{rd} processes are $M_1(x) = 100x^3 + 20x^2 + 10$, $M_2(x) = 20x^4 + 10x^2 - 20$ and $M_3(x) = x^3 + 20$ and the waste management cost for each of the processes are $W_1(x) = 0.01x^2 - 0.008x$, $W_2(x) = 0.01x^4 - 0.001x^3 + 0.001x^2$ and $W_3(x) = 0.01x^2$ respectively, where x is the cost of raw material per kg.

(a) What will be the effective manufacturing cost $E_1(x),\ E_2(x),\ E_3(x)$ for each of the processes?

(b) What will be the ratio of effective manufacturing cost of 1^{st} and 3^{rd} process when the cost of raw material per kg is ₹ 1?

(c) Which of the process among $M_1,\ M_2$, and M_3 should the company choose when the cost of raw material per Kg is ₹ 10.

8. What will the value of c if $y = 2x^5 - 4x^4 - 3x + c$ is the best fit using SSE for the given table **??**?

y	x
0	0
-4	1
-7	2
151	3

Table T-6.2