

MHF4U1 - UNIT 3 – POLYNOMIAL FUNCTIONS
SUPPLEMENTARY REVIEW PROBLEMS

Multiple Choice

In the blank space provided, identify the letter of the choice that best completes the statement or answers the question.

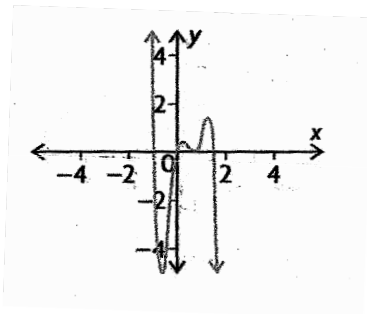
- ___ 1) The degree of $f(x) = 2x^2 + 6x^3 - x^4$ is
a. 1
b. 2
c. 4
d. 9
- ___ 2) Which of the following statements are true for $f(x) = -2(x-1)(x-2)(x+3)(x+4)$?
i) as $x \rightarrow \infty, f(x) \rightarrow -\infty$
ii) as $x \rightarrow \infty, f(x) \rightarrow \infty$
iii) as $x \rightarrow -\infty, f(x) \rightarrow \infty$
iv) as $x \rightarrow -\infty, f(x) \rightarrow -\infty$
a. i)
b. i) and ii)
c. i) and iii)
d. i) and iv)
- ___ 3) The function $f(x) = -2x(x-1)(x-2)(x+2)$
a. has 4 zeros
b. has an absolute maximum
c. as $x \rightarrow -\infty, f(x) \rightarrow -\infty$
d. all of the above
- ___ 4) A factor of $x^4 - 5x^2 + 4$ is
a. $x-2$
b. $x-1$
c. a and b
d. neither a nor b

Full Solution

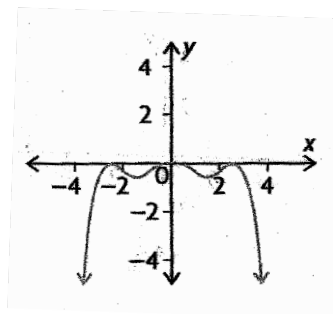
Provide full solutions to the following problems on a separate page.

- 5) Divide $(x^3 - 7x - 6) \div (x - 3)$.
- 6) Divide $(x^4 - 8x^3 + 2x^2 + 24x + 9) \div (x^2 - 2x - 1)$.
- 7) For the graphs of polynomial functions shown below, state whether the leading coefficient of the polynomial is positive or negative, and whether its degree is even or odd.

a)



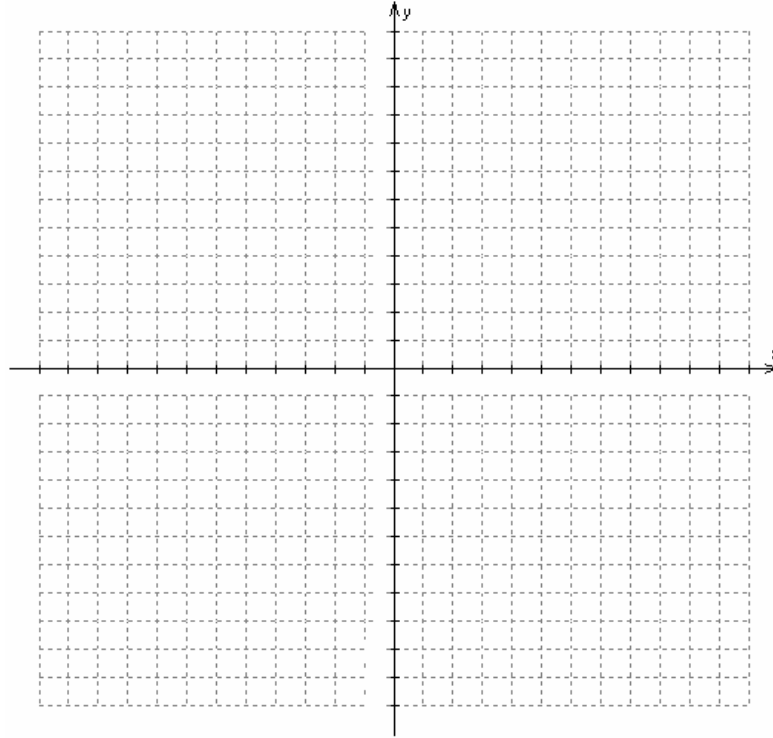
b)



8) Factor $x^3 - 5x^2 - x + 5$.

9) Factor $64x^3 - 27$.

10) Sketch the graph of $f(x) = x^4 - 3x^3 - 9x^2 + 27x$ using the zeros and end behaviour. You may use the following grid for your sketch if you wish, but please show all calculations on a separate page.

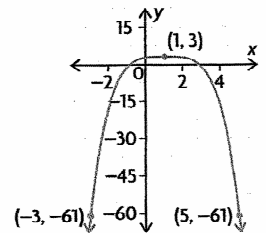


11) Given the base function $y = x^3$, write the equation after the graph has been vertically reflected (in the x -axis), vertically stretched by a factor of 2, horizontally stretched by a factor of 3, horizontally shifted 4 units right and a vertically shifted 2 units down. You do not need to simplify your answer.

12) $2x + 3$ is a factor of $2x^3 + 5x^2 + 5x + p$. Calculate p .

13) Determine the equation (in factored form) of the cubic function with zeros 2, 4, and -5, and a y -intercept of 20.

14) Find the equation for the quartic function whose graph is shown on the right. You do not need to simplify your answer.



15) Briefly describe how the graphs of $f(x) = k(x - s)(x - t)(x - u)$ and $g(x) = k(x - s)(x - t)^2$ differ. You may answer in point form.

16) The graph of the function $f(x) = k(x - a)(x - b)^2(x - c)^3$ has zeros at a , b , and c . Briefly describe the appearance of the graph at each of these zeros.

17) Prove that $(x + a)^5 + (x^2 + ax)^5 + \left(1 + \frac{a}{x}\right)^5$ has no remainder when divided by $x + a$.