

Lesson 3: Factor Theorem

Question #1

Reference Q.18048

State the definition of the Factor Theorem.

Question #2

Reference Q.18049

For each of the following statements decide whether it is true or false and give a reason.

- The binomial $(x - 1)$ is a factor of $x^4 - 1$.
- If $x^2 + 1$ is divided by $(x + 1)$, then the remainder is zero.

Question #3

Reference Q.11947

If $x - a$ is a factor of the polynomial $P(x)$, what is the remainder obtained when $P(x)$ is divided by $x - a$?

Question #4

Reference Q.11948

Determine which of the following binomials are factors of

$$P(x) = x^3 - 4x^2 - x + 4.$$

- $x - 1$
- $x - 2$
- $x + 2$
- $x - 4$

Question #5

Reference Q.18051

$$\text{Let } p(x) = x^4 - 10x^3 + 35x^2 - 50x + 24.$$

- List the possible numbers to test via the factor theorem.
- Use the factor theorem and the synthetic division to find all the factors.

Question #6

Reference Q.18052

$$\text{Let } p(x) = 2x^3 + 9x^2 + 10x + 3.$$

- List the possible numbers to test by using the factor theorem.
- Use the factor theorem and the synthetic division to find all the factors.

Question #7

Reference Q.18053

Solve the following equation, giving that at least one of the solutions is an integer between -5 and 5 .

$$x^3 - 13x + 12 = 0$$

Question #8

Reference Q.11958

If a polynomial $P(x)$ has $P(8) = 0$, then which of the following statements must be true?

- The constant term in $P(x)$ is 8 .
- The constant term in $P(x)$ is -8 .
- A factor of $P(x)$ is $x + 8$.
- A factor of $P(x)$ is $x - 8$.

Question #9

Reference Q.11949

Find the value of a so that $x + 1$ is a factor of

$$x^4 + 4x^3 + ax^2 + 4x + 1.$$

Question #10

Reference Q.11950

When $P(x) = 2x^3 + ax^2 + bx + 6$ is divided by $x + 2$, the remainder is -12 . If $x - 1$ is a factor of the polynomial, find the values of a and b .

Question #11

Reference Q.11952

Show that -4 is a zero of $P(x) = 6x^3 + 25x^2 + 2x - 8$ and find the other zeros.

Question #12

Reference Q.11953

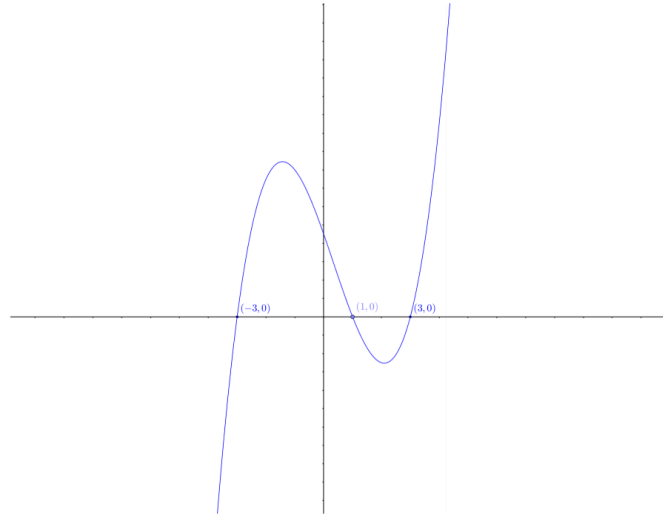
Given that $x^2 + 2x - 3$ is a factor of

$f(x) = x^4 + 2x^3 - 7x^2 + ax + b$, find a and b and hence factor $f(x)$ completely.

Question #13

Reference Q.18050

Consider the graph of $f(x) = x^3 + ax^2 + bx + c$ provided below.



- Find all the factors of $f(x)$.
- Recall $f(x) = x^3 + ax^2 + bx + c$, find the values for a and c .
- In general, explain how you know a and c values without having complicated computations assuming the leading coefficient is 1.
- Use the factor theorem to find b value and write the explicit expression for $f(x)$.

Question #14

Reference Q.11951

If $P(x) = x^3 + kx^2 - x - 2$ and $P(-2) = 0$, determine the complete factoring of $P(x)$.