2.1 The Remainder Theorem

2.1 NOTES

ALGEBRA 2

Write your questions here!

Remember Function Notation? Zeros? Long division? Factoring?

Let's look at $F(x) = x^3 + 2x^2 - 3$

a. Find $\frac{x^3+2x^2-3}{(x-3)}$ using long division

b. Find $F(3)$.

Let $G(x) = 2x^2 + 9$

a. Find $\frac{2x^2+9}{(x+2)}$ using long division

b. Find $G(-2)$.

Let $H(x) = 2x^3 + x^2 - 41x + 20$

a. Find $\frac{2x^3+x^2-41x+20}{(x-4)}$

b. Find $H(4)$.

Let's summarize what we found below:

Given $K(x) = 8x^3+30x^2 + 37x + 15$, find $K(-1)$. Then factor $K(x)$ completely.

Create a polynomial that has zeros of 4, -3 and $-\frac{1}{2}$.

Find the value of *k* such that $\frac{x^3-kx^2+2}{x-1}$ has a remainder of 8.

You try!

Show that $x^{51} - 21x + 20$ is divisible by $(x - 1)$.

Find the value of *w* such that $\frac{wx^3-wx-x^2}{x+3}$ has a remainder of -9

SUMMARY:

Now, summarize your notes here!

2.1 Remainder Theorem

2.1 PRACTICE

Use the Remainder Theorem to find the remainder for each of the following divisions:

1. $\frac{x^2+3x+1}{x-2}$

2. $\frac{x^3-6x^2-7x+1}{x+4}$

3. $\frac{16x^4-1}{x+1}$

4. Is $(r-5)$ a factor of $2r^3-15r^2+27r-10$? Find out by using the Factor theorem.

5. Is $(x+1)$ a factor of $-2x^5-4x^4+x-10$? Find out by using the Factor theorem.

6. Consider the polynomial function $B(w)=2w^3-w^2-7w+6$

   a. Verify that $B(-2)=0$. Since $B(-2)=0$, what must one of the factors of B be?

   b. Find the remaining factors.

   c. State the zeros of B.

7. Write a polynomial function in standard form that meets the stated conditions.

   a. The zeros are 5 and -4.

   b. The zeros are $-\frac{1}{2}$, 2 and -6.

8. Factor completely: $28d^3+8d^2-7d-2$

9. Factor completely: $20n^4+3n^2-2$

10. Is x = -6 a zero of $30x^3+197x^2+100x-12$?

11. Is p = -6 a zero of $3p^3+23p^2+28p-12$?

12. Find the value of k so that $\frac{kx^3+x-k}{x+2}$ has a remainder of 16.

13. Show that $(x+1)$ is a factor of $19x^{42}+18x-1$

2.1 Remainder Theorem

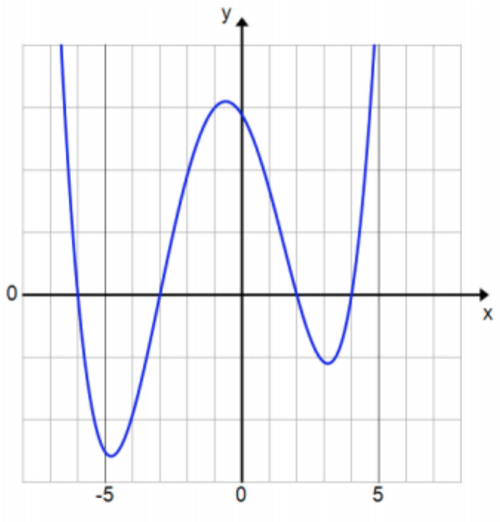
WRAP UP

1. Given that $P(4)=2$, is $(x-4)$ a factor of $P(x)$?

2. Is x = -3 a zero of $4x^3-23x^2-81x+72$?

3. Mr. Bean loves "W" graphs. He plays around with his calculator until he finds this beauty of a function:

$$F(x) = x^4 + 3x^3 - 28x^2 - 36x + 144$$



a. Is 1 a zero of the function $F(x)$?

b. Is $(x + 3)$ one of the factors of $F(x)$?

c. Bean rewrites his polynomial in factored form: $F(x) = (x + 6)(x + 3)(x - 2)(x - 4)$
Set the function equal to zero and solve.

d. Compare your solutions to the graph above. What do you notice about the solutions to the Function and the graph of the function?

EXIT TICKET

If k is a constant, what is the value of k such that the polynomial $k^2x^3 - 6kx + 9$ is divisible by x – 1?