September 21

Remainder Theorem

If a polynomial is divided by $x-a$, the remainder is $P(a)$.

Ex1 Determine the remainder for
$(4x^2-2x+7)\div(x-1)$

$$x-1=0$$
$$+1 \quad +1$$
$$x=1$$

$$4x^2-2x+7$$
$$4(1)^2-2(1)+7=\boxed{9}$$

Ex2 Determine the remainder of
$(m^8+6m^5-5)\div(m+2)$

$$m+2=0$$
$$-2 \quad -2$$
$$m=-2$$

$$m^8+6m^5-5$$
$$(-2)^8+6(-2)^5-5=\boxed{59}$$

Factor Theorem

- If $P(a) = 0$, then $x - a$ is a factor of the polynomial.

E3 Is $x-5$ a factor of $2x^3 - 18x^2 - 2x + 210$?

$$x - 5 = 0$$
$$\underline{\;+5 \quad +5\;}$$
$$x = 5$$

$2x^3 - 18x^2 - 2x + 210$

Remainder

$\downarrow$

* $2(5)^3 - 18(5)^2 - 2(5) + 210 = 0$

* you must show this work!

$\boxed{\text{yes, } x-5 \text{ is a factor}}$

Ex4 Is $x+8$ a factor of $9x^3 + x - 7$?

$$x + 8 = 0$$
$$\underline{\;-8 \quad -8\;}$$
$$x = -8$$

$9(-8)^3 + (-8) - 7 = -4623$

$\boxed{\text{no, } x+8 \text{ is not factor}}$