Polynomial Functions.(Tute 1)

Long Division

1.Show that the polynomial function $f(x)=x^3+2x^2+x+2$ is divided by $(x+1)$ the quotient is (x^2+x) and the remainder is 2. Show also that $f(-1)=2$.

2.Let $f(x)=2x^3+x^2+x+3$. Let $f(x)$ is divided by $(2x-1)$. Then show that the quotient is (x^2+x+1) and the remainder is 4. Also find $f\left(\frac{1}{2}\right)$. what can you conclude by this result.

3.The polynomial function $f(x)$ is defined as $f(x)=2x^3-2x^2+8x+3$. Show that when $f(x)$ is divided by $(2x-2)$ the quotient is (x^2+4) and remainder is 11. Determine the value a so that $f(a)$ gives the remainder above.

4.Show that when $f(x)=x^3+2x^2+2x+2$ is divided by (x^2+1) the quotient is $(x+2)$ and remainder is x.

5.Show that when $f(x)=x^4+2x$ is divided by (x^2-1) the remainder is $(2x+1)$ and the quotient is (x^2+1). Is it possible to find a relationship among $f(x)$, (x^2-1), (x^2+1) and $(2x+1)$. If so state this relationship.

6.Show that when $f(x)=x^4+x^3+x^2+2x+3$ is divided by (x^2+x-1) the quotient is (x^2+2) and remainder is 5. Justify the result you stated in question 5 above.

Use of algorithm of division to divide a polynomial function by another polynomial function.

7.Show that when x^3+2x^2+3x-2 is divided by (x^2+x), the quotient is $(x+1)$ and the remainder is $2x-2$.

8.Show that when x^4+x^2+x-2 is divided by (x^2-1) the quotient is (x^2+2) and the remainder is x.

9.Let $f(x)=x^3+4x^2+x-2$. $f(x)$ is divided by (x^2+x-2). Show that the quotient and remainder are $(x+3)$ and 4 respectively.

10.Let $f(x)=x^3+2x^2+6x+9$. $f(x)$ is divided by (x^2+4). Show that the quotient and remainder are $(x+2)$ and $(2x+1)$ respectively.

Remainder theorem

11.Let $f(x)=x^3-ax^2+3x-b$. When $f(x)$ is divided by $(x-1)$ and $(x+1)$ the remainders are 1 and -7 respectively. show that $a=2$ and $b=1$.

12.The polynomial $f(x)$ is degree 3 with leading coefficient 1. when $f(x)$ is divided by $(x-2)$, $(x-1)$ and $(x+2)$, the corresponding remainders are 25, 8 and 17 respectively. Show that $f(x)=x^3+4x^2-2x+5$.

13.Let $f(x)=x^3+ax^2+bx+c$. When $f(x)$ is divided by (x^2+x) and $(x-1)$ the remainders are $(x-1)$ and 6 respectively. Find the values of a, b and c. $[a=3, b=3=-1]$.

Factor theorem and its converse

Use converse of factor theorem.

14.Let $f(x)=x^3-4x^2+x+6$.

Show that $(x+1),(x-2)$ and $(x-3)$ are factors of $f(x)$.

15.Show that $(2x-1),(x+2)$ and $(x+1)$ are factors of $f(x)=2x^3+5x^2+x-2$.

16.Let $f(x)=x^3+2x^2-5x-6$. three linear factors of $f(x)$.

Hence write down $f(x)$ in factor form.

Use of factor theorem

17.Let $f(x)=x^3+ax^2+bx+c$. If $(x+2),(x+3)$ and $(x+1)$ are factors of $f(x)$, then find the values of *a, b* and *c*. $[a=6, b=11, c=6]$.

18.Let $f(x)=ax^3+bx^2-cx+1$. If $(2x-1),(x+1)$ and $(x-1)$ are factors of $f(x)$, then find the values of *a, b* and *c* $[a=2, b=-1, c=2]$

Use of remainder theorem and factor theorem

19. $f(x)$ is a polynomial fucction in x of degree 4. $(x+2)$ and $(x-3)$ are factors of $f(x)$. When $f(x)$ is divided by $(x-1)$ and $(x+1)$ the remainders are -12 and 8 respectively. Also $f(x)-6$ is divided by x.

Show that $f(x)=x^4+x^3-9x^2-11x+6$.

20. $f(x)$ is a polynomial function of degree 3. $(x+1)$ is a factor of $f(x)$. When it is divided by $(x+2)$,$(x-1)$ and $(x+3)$, the remainders are 1, 12 and -20 respectively. Show that $f(x)=2x^3+5x^2+4x+1$.

Show also that when $f(x)$ is divided by (x^2-4), the quotient is $(2x+5)$ and the remainder is $3(4x+7)$.

Hence show that when $f(x)$ is divided by (x^2-3) the quotrent is $(2x+5)$ and remainder is $2(5x+8)$.