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(1) Simplify the following algebraic fractions:

(a) $\frac{x^2+2x}{x}$

(b) $\frac{2x^2-3x+5}{x}$

(c) $\frac{x^2-x-12}{x-4}$

(d) $\frac{2x^2-5x-12}{2x+3}$

(e) $\frac{4x^2-25}{2x-5}$

(f) $\frac{a^2-b^2}{2(a+b)}$

(2) Explain whether or not you can use long division to simplify the following fractions:

(a) $\frac{x^2+2x+4}{2x^2+3x+1}$

(b) $\frac{4x^3-2x^2+3}{x+1}$

(c) $\frac{3x^2+x-4}{x^3+7x+4}$

(3) Find the quotient when x^3+2x^2-4x+1 is divided by $x-1$.

(4) Find the quotient **and** remainder when $x^4+3x^3+x^2-2x+1$ is divided by $x-2$.

(5) Find the quotient **and** remainder when $2x^4+3x^2+x-3$ is divided by $x+3$.

(6) Simplify $\frac{4x^3-7x^2+2x+1}{2x-3}$

(7) Show that $(x+2)$ is a factor of x^3-x^2+x+14

(8) State which of the following are factors of $2x^4+3x^3-24x^2-13x+12$:
(i) $(x-3)$
(ii) $(x-1)$
(iii) $(2x-1)$
(iv) $(x+4)$

(9) Explain why $(3x-2)$ is not a factor of x^4+5x^2+2x-1.

(10) Given that $(x-2)$ is a factor of $2x^3-x^2+2p+3$ find the value of p.

(11) $f(x)=x^3+px^2+qx+6$
Given that $(x-3)$ and $(x+1)$ are factors of $f(x)$, find the values of p and q.

(12) $g(x)=2x^3-7x^2-10x+24$
Given that $(x-4)$ is a factor of $g(x)$, fully factorise $g(x)$.

(13) Solve the equation $x^3+x^2-17x+15=0$.

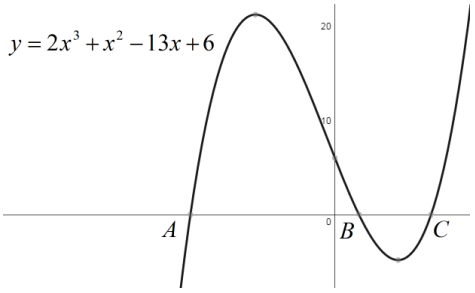
(14) Find the remainder when x^3+2x^2-4x+2 is divided by $(x-1)$.

(15) When $4x^3-px^2+3$ is divided by $(x+1)$ the remainder is 4. Find the value of p.

(16) $f(x)=2x^3+px^2+x+q$
When $f(x)$ is divided by $(x+3)$ the remainder is -12. Given also $(x-1)$ is a factor of $f(x)$ find the values of p and q.

(17) Given when $4x^2-ax+3$ is divided by $(x+1)$ the remainder is the same as when it's divided by $(x-2)$, find the value of the constant a.

(18) The graph below shows part of the curve $y=2x^3+x^2-13x+6$. Given that $A=-3$, find the values of B & C.



(19) $f(x)=3x^3+4x^2+px-2$
(a) Given $(x-1)$ is a factor of $f(x)$ show that $p=-5$.
(b) Find all of the solutions to the equation $f(x)=0$.

(20) Given that $\frac{x^4-x^3-19x^2-11x+30}{(x+2)}$ can be written in the form (Ax^3+Bx^2+Cx+D) show that $A+B+C+D=0$.

(21) When $4x^3+ax^2+bx-2$ is divided by $(1-2x)$ the remainder is 6.
(a) Find a linear relationship between a and b.
(b) Given further that $\frac{a}{3}=b$, find the value of $(ab)^{0.5}$ in the form $k\sqrt{3}$ where k is a constant to be found.

(22) Sketch the graph of $y=2x^3-5x^2-x-6$ showing any points of intersection with the coordinate axis.