1. Let $z_1 = 6+2i$, $z_2 = 5-7i$. Find (a) $z_1 + z_2$ (b) $z_1 - z_2$ (c) $z_1 z_2$ (d) $\frac{z_1}{z_2}$

a) $6+2i + 5-7i = \underline{11-5i}$

b) $6+2i - (5-7i) = 6+2i-5+7i = \underline{1+9i}$

c) $(6+2i)(5-7i) = 30-42i+10i-14i^2$

$= 30-32i+14$

$= \underline{44-32i}$

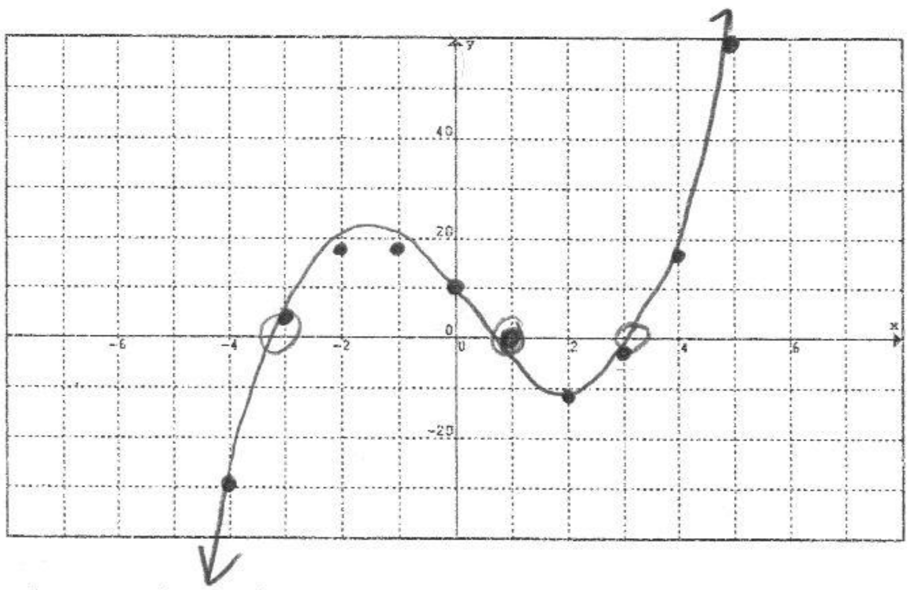
2. Consider the polynomial function $f(x) = x^3 - x^2 - 10x + 10$.

a. This function is not a quadratic function, so what is it?

Cubic

b. Use synthetic substitution to evaluate the function at the given integer x values.

c. Plot each of these points on the graph to form a continuous curve.



x	$f(x)$
-4	-30
-3	4
-2	18
-1	18
0	10
1	0
2	-6
3	-2
4	18
5	60

d. According to the graph, how many *real* zeroes will there be?

3 real zeros

e. Find all the zeroes including any imaginary solutions.

$$\begin{array}{r|rrrr} 1 & 1 & -1 & -10 & 10 \\ & \downarrow & 1 & 0 & -10 \\ \hline & 1 & 0 & -10 & 0 \end{array}$$

$(x-1)(x^2-10)$

Zeros: $x = 1$ or $x = \pm\sqrt{10}$

3. Use synthetic substitution or direct substitution to quickly find the remainder when the polynomial on the left is divided by the linear binomial on the right.

a. $3x^3 + 7x^2 - 12x + 1$ by $x+3$

$$\begin{array}{r|rrrr} -3 & 3 & 7 & -12 & 1 \\ & \downarrow & -9 & 6 & 18 \\ \hline & 3 & -2 & -6 & \boxed{19} \end{array}$$ ← remainder

b. $x^{2000} + 2000$ by $x-1$

$(1)^{2000} + 2000 = \boxed{2001}$ ← remainder