Part A : Multiple choice (choose the best response)

1. What is the remainder if $\left(2x^3 - x^2 + x - 3\right)$ is divided by $(x+2)$?

a) -25   b) -19   c) 11   d) 19

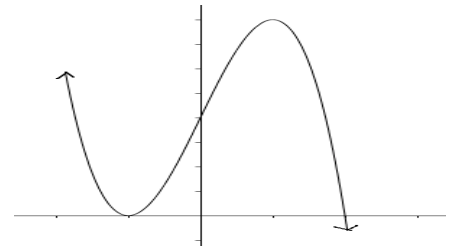2. Which is a zero of the following function $f(x) = 3x^3 + 4x^2 - 2x + 6$?

a) $x = 1$ b) $x = 2$ c) $x = 3$ d) none of these solutions

3. What is the degree of the polynomial function $y = -5x(x+3)^2(x-1)$?

a) 2   b) 3   c) 4   d) 5

4. Which of the following statements is must be true about the following polynomial function?
a) Has an even degree with a negative leading coefficient.
b) Has an even degree with a positive leading coefficient.
c) Has an odd degree with a negative leading coefficient.
d) Has an odd degree with a positive leading coefficient.

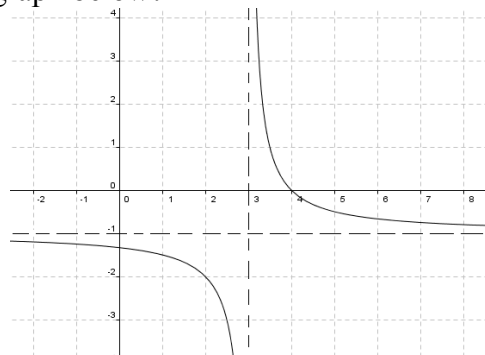5. Which of the following functions has a point of discontinuity at $x = 2$?

a) $y = \dfrac{x-2}{x^2-2}$ b) $y = \dfrac{x-2}{x^2-4}$ c) $y = \dfrac{1}{x-2}$ d) $y = \dfrac{x+2}{x^2-4}$

6. Find the domain of the following function $f(x) = \dfrac{x-1}{(x-1)(x+2)}$.

a) $x \in R, x \neq 1, -2$ b) $x \in R, x \neq -2$ c) $x \in R, x \neq 1$ d) $x \in R$

7. Which of the following equations is that of the graph below?

a) $y = \dfrac{-1}{x+3} - 1$ b) $y = \dfrac{-1}{x-3} - 1$

c) $y = \dfrac{1}{x-3} - 1$ d) $y = \dfrac{1}{x+1} + 3$

Part B : Short Answer (non-calculator)

1. If $f(-1) = 0$, what factor of the polynomial function $f(x)$ would correspond to a zero?

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2. Give the equation of a function that has a point of discontinuity at $x = 0$ and an asymptote at $x = 4$.

   _____

3. Give the equation of the horizontal asymptote that corresponds to the following function:
   $$y = \frac{3x - 4}{x - 2}$$

   _____

4. Give one similarity and one difference between the following functions.
   $$f(x) = x + 3 \text{ et } g(x) = \frac{(x+3)(x+1)}{x+1}$$

5. Explain the behaviour of the graph when $x \to \pm\infty$ if $y = (x - 3)(4 - x)(x - 5)$.

6. State the equation of all the asymptotes of the graph: $y = x + 3 - \dfrac{1}{x - 2}$

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7. Use the remainder theorem to determine if $x - 2$ is a factor of the polynomial function $f(x) = x^3 - 7x + 6$.
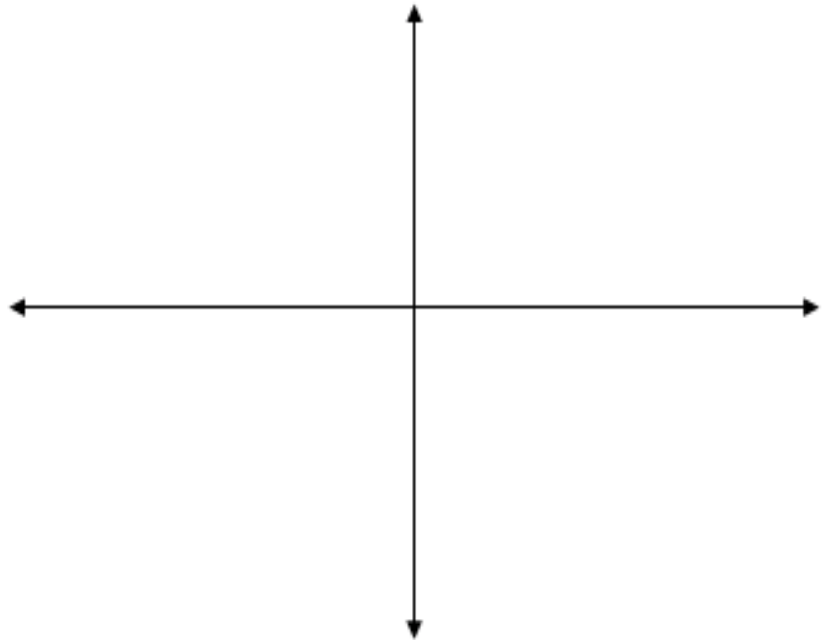
Part C : Long answer (NO CALCULATOR)

1. Give the equation of a polynomial function that has the following characteristics:
   - Multiplicity of 2 at $x = 1$.
   - Polynomial of the 4th degree.
   - Has a y-intercept of -10.

/3

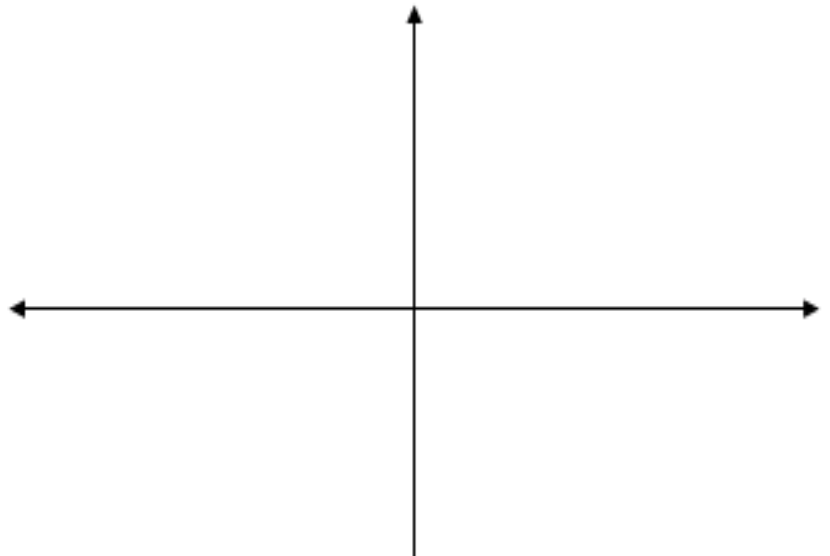2. Sketch the following graphs. Make sure to clearly indicate the x and y-intercepts and your scale.
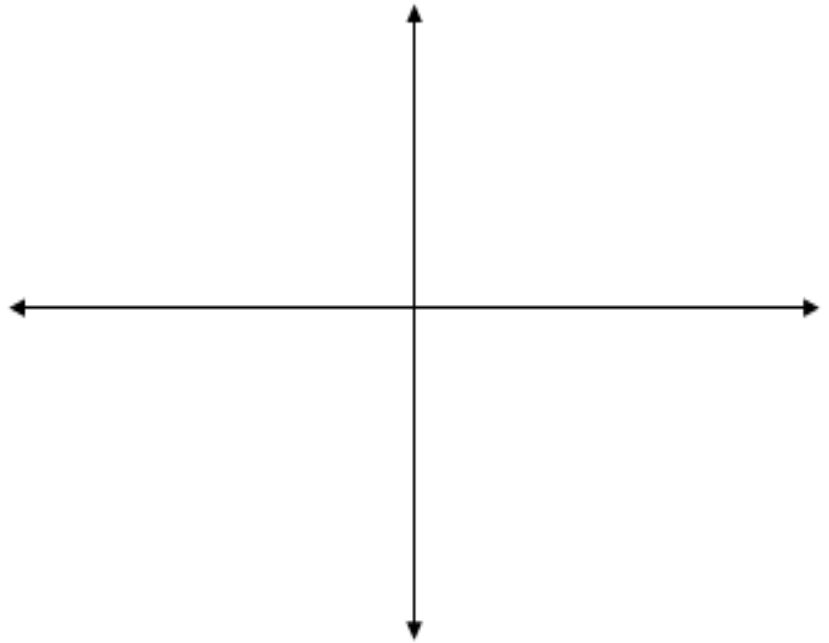
   a) $f(x) = (x-4)^2(1-x)$

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   b) $g(x) = \dfrac{2-x}{x+1}$
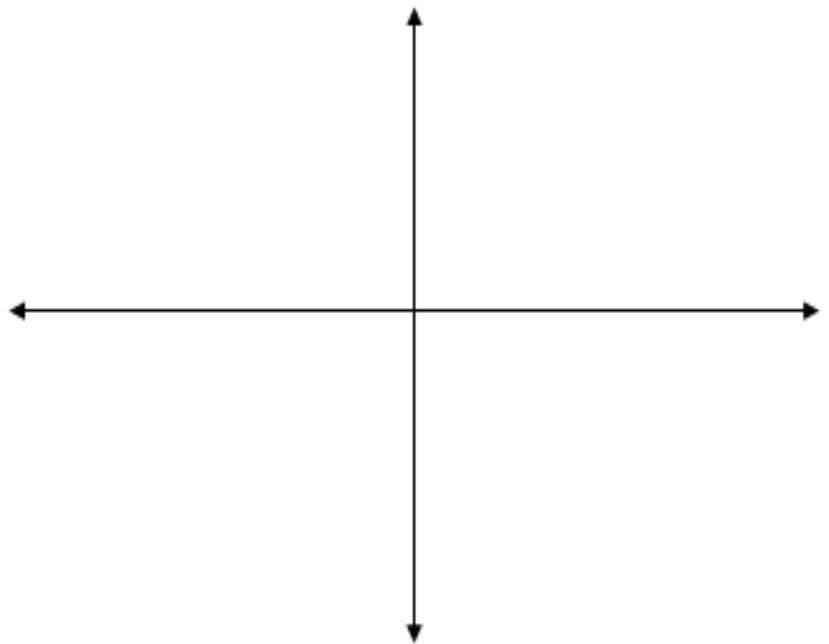
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c) $h(x) = \dfrac{x+2}{(x+2)(x+1)}$

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d) Find the domain and range of $h(x)$.

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3. Sketch the following graph: $P(x) = x^3 - 6x^2 - x + 30$

/4

4. A box has dimensions $(x+2)$ cm, $(5-x)$ cm et $(3-x)$ cm. If the volume of this box is 24cm^3, find the possible values of x and the possible dimensions of this box.

/4