Key Concepts Review Chapter 4

1. Graph each polynomial function and label all intercepts:

a) $f(x) = x^4 - 2x^3 - 15x^2$

b) $f(x) = x^5 - 2x^4 - 15x^3$

c) $f(x) = -x^4 - 4x^3 - 4x^2$

d) $f(x) = -x^3 - 4x^2 - 4x$

2. Divide each of the following using polynomial long division:

a) $\dfrac{4x^4 - 8x^3 - 13x^2 - 38x + 37}{2x - 7}$

b) $\dfrac{6x^3 + 2x^2 + 22x}{2x^2 + 5}$

c) $\dfrac{9x^3 + 17x - 14}{3x - 2}$

d) $\dfrac{x^5 + x^3 - 2x^2 - 5}{x^2 + 1}$

3. Construct a polynomial given the information below:

a) a second degree polynomial with zeros –2 and 5 and a constant term of –30
b) a third degree polynomial with zeros –1 and $2 + 3i$ and a constant term of 13.
c) a fourth degree polynomial with zeros $2i$ and $1 - i$ and a constant term of 16.
d) a fourth degree polynomial with zeros $1 + 2i$ and $2 - i$ with a constant term of 100.

4. For each of the following,
i) List all possible rational zeros of $P(x)$
ii) Find all roots of $P(x)$

a) $P(x) = 6x^4 + x^3 - 45x^2 + 26x + 24$

b) $P(x) = 5x^3 - 22x^2 + 18x - 4$

c) $P(x) = 2x^4 + 5x^3 - x^2 - 3x + 1$

d) $P(x) = x^5 - 2x^4 + x^3 - 2x^2 - 12x + 24$

5. For each of the following rational functions,
i) Find the x and y–intercepts,
ii) Find the equation of the vertical asymptote.
iii) Find the equation of the horizontal asymptote.
iv) Sketch the graph.

a) $f(x) = \dfrac{x}{x + 1}$

b) $f(x) = \dfrac{3x - 4}{x - 2}$

c) $f(x) = \dfrac{5x + 10}{x - 2}$

d) $f(x) = \dfrac{2x + 3}{4x - 1}$