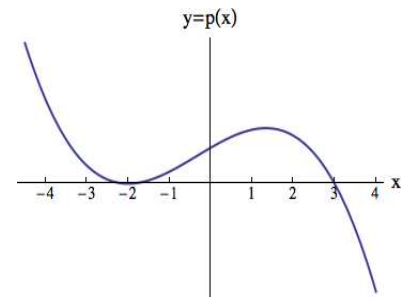**4.** [12 points]

    a. [4 points] The graph of a polynomial $p(x)$ is shown below. The following facts are known about $p(x)$:

        i) The only zeros of $p(x)$ are $x = -2$ and $x = 3$.

        ii) The degree of $p(x)$ is at most four.

        iii) The point $(1, 9)$ is on the graph of $p(x)$.

    Find a formula for $p(x)$.

$$p(x) = \underline{\hspace{6cm}}.$$

    b. [5 points] Let

$$R(x) = \frac{(x^2 + 9)(10x + 1)}{7x^3 - x}.$$

    Find all the intercepts and all horizontal and vertical asymptotes of the graph $y = R(x)$. If appropriate, write "None" in the answer blank provided. Your answers should be in **exact form**.

        i) x-intercept(s): $\underline{\hspace{5cm}}$

        ii) y-intercept(s): $\underline{\hspace{5cm}}$

        iii) vertical asymptote(s): $\underline{\hspace{5cm}}$

        iv) horizontal asymptote(s): $\underline{\hspace{5cm}}$

    c. [3 points] A law of physics states that the force F (in Newtons) exerted between two objects is inversely proportional to the square of the distance r (in meters) between them, and $F = 30$ when $r = 7$. Find a formula for F in terms of r.

$$F(r) = \underline{\hspace{4cm}}$$