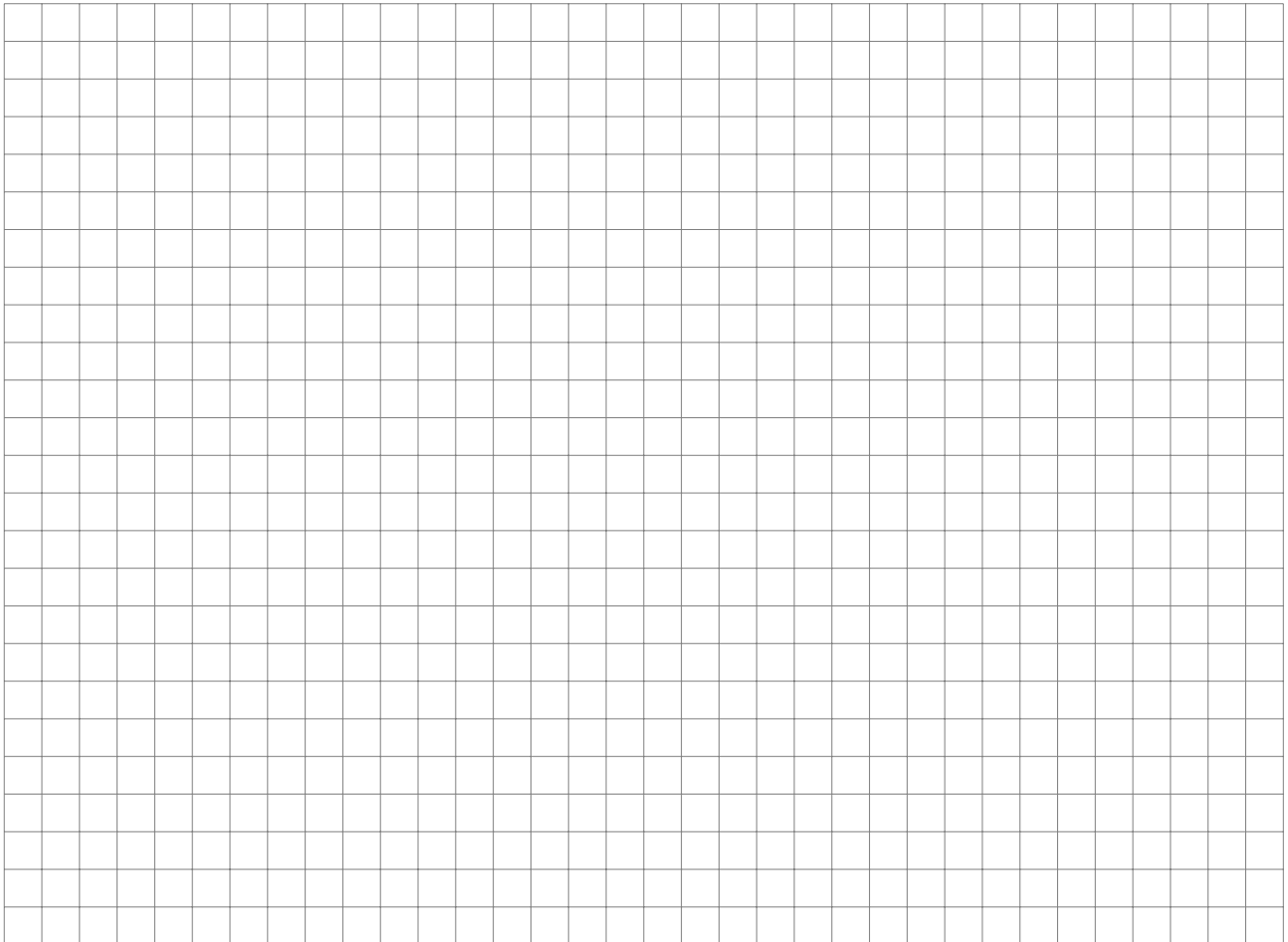**1.**   [*4 points*]

Let $f(x) = \frac{1}{2}(2-x)(a+x)$, where $x \in \mathbb{R}$ and $f(x)$ is an even function.
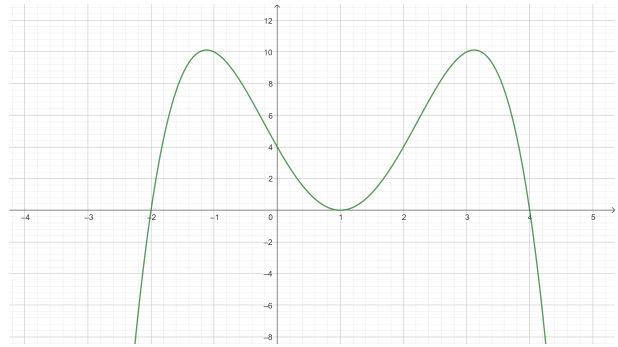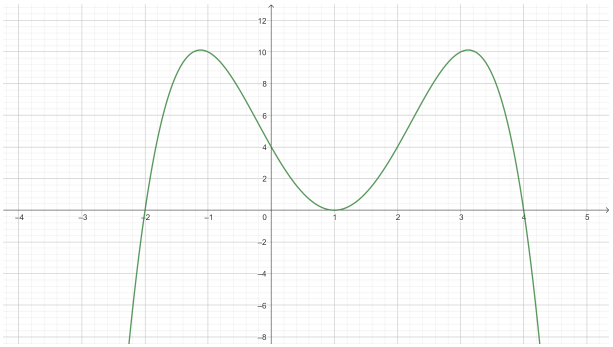
(a) State the value of a.

(b) Sketch the graph of $g(x) = \frac{1}{f(x)}$ clearly indicating any asymptotes and axes intercepts.

2.   [6 *points*]

The following diagrams show a graph of a quartic polynomial $P(x)$.

(a) Find the formula for $P(x)$.

(b) On the diagrams sketch the graph of (a) $P(|x|)$ and (b) $|P(x)|$.

3.   [4 *points*]

Let $P(x) = 2x^3 + 3x^2 - 11x - 6$. Given that $x - 2$ is a factor of $P(x)$

    (a) Factorize $P(x)$ into linear factors.

    (b) Solve the inequality $P(x) \leqslant 0$.

4. [*6 points*]

Let $f(x) = 2^x - 2$, Sketch the graph of (a) $\frac{1}{f(x)}$ and (b) $\left(f(x)\right)^2$, clearly indicating any asymptotes and axes intercepts.