

Inequality 1

1. Prove the inequality $a^2 + b^2 \geq 2ab$. If $x + y + z = c$, show that $x^2 + y^2 + z^2 \geq \frac{1}{3}c^2$.
2. Find the solution set for the inequality: $\left| \frac{4}{x-1} \right| \geq 3 - \frac{3}{x}$
3. Solve $|5 - 2x| \leq 3x + 10$, $|5 - 2x| < 3x + 10$
4. Sketch on the same axes, the graphs of $y = |2x + 1|$ and $y = 1 - x^2$.
Hence, solve the inequality $|2x + 1| \geq 1 - x^2$.
5. Show that

$$-2 \leq \frac{4x}{4x^2 + 2x + 1} \leq \frac{2}{3}, \text{ where } x \text{ is real.}$$