

Math Match Problems

1. There are **8** people in the room, and everyone shakes hands with everyone else. How many handshakes are there in all?
Derive a formula for the number of handshakes if **n** people are in a room.
2. Show that every function can be expressed as a sum of an even and an odd function.
3. Prove the existence of the number $\sqrt{5}$ using The Intermediate Value Theorem.
4. Solve the inequality $|x - 1| - |x - 3| \geq 5$ algebraically.
5. Use The Intermediate Value Theorem to prove that any continuous function with domain $[0, 1]$ and range being a subset of $[0, 1]$ must have a fixed point.
6. Suppose f is a function with the property that $|f(x)| \leq x^2$ for all x . Show that $f(0) = 0$ and $f'(0) = 0$.
7. Knowing that $\lim_{x \rightarrow a} [f(x) + g(x)] = 5$ and $\lim_{x \rightarrow a} [f(x) - g(x)] = 2$, find $\lim_{x \rightarrow a} [f(x)g(x)]$.
8. Find the n^{th} derivative of the function $f(x) = \frac{x^n}{1-x}$. (Hint: use long division first)