The equation

$$u_t = u_{xx} + ru(1-u)$$

is considered and called Fisher equation. Sometimes we say that a travelling wave solution is a solution and it is also $u(x,t) = U(x-ct)$ with $z = x - ct$ with

$$\lim_{z\to\infty} U(z) = 0, \qquad \lim_{z\to-\infty} U(z) = 1.$$

Theorem 1: If $c \geq 2\sqrt{r}$ and $c^* = 2\sqrt{r}$ and $c \geq c^*$ then there exists a travelling wave solution, but not for $c < c^*$.

Theorem 4.4: If there is a regular Sturm-Liouville problem that we analyse then we want to know something about the spectrum, that is some eigenvalues. This spectrum eigenvalue set is countable and infinite and no limit points. Different are two eigenvalues that are related to two different eigenfunctions that are orthogonal to each other, respectively.

The following theorems were first proven and published and in the Mathematische Annalen by Ludwig Sylow.

The First One: There exists a Sylow p-subgroup of G, of order p^n, of a finite group G, of order that has a prime factor p of multiplicity n.

Cauchy is weaker and he proved the following Corollary earlier.

The Second One: If the finite order of a finite group G is the finite factor p. And if this p is prime, then an element has order p which exists in G.

Theorem 1: Consider equations which are (1) and (2), are being studied. One assumptions is that the function $h(x)$ is zero when $x = 0$, I mean $h(0) = 0$. Then a unique solution exists, which is positive or not, provided we assume the initial conditions are positive or not.

Theorem 2: We find

$$\int_\Omega |\nabla u|^2 dx \leq c \int_\Omega u^2 dx$$

for each solution of the Poisson equation $\Delta u = \varepsilon u$ on a bounded domain $\Omega \subset R^n$, whenever $\varepsilon < \varepsilon^*$, where ε^* exists and is positive.

Introduction

... A proof of this relationship has been given by Author and Writer in [19]. However, this paper really sucks! Apparently, the author did not understand the concept of Lipschitz continuity and the whole proof is flawed. We will not only fix this, but we do much better. We will show that for each analytic function $f(x)$ the above formula (1) is true.

Theorem 3: Assume ε and $\bar{\varepsilon}$ are related by (44) and (43) and (45) define, respectively, T_ε and $T_{\bar{\varepsilon}}$. Then the conclusion is that

$$\frac{T_\varepsilon}{T_{\bar{\varepsilon}}} < 1$$

and we need to assume as well that $\varepsilon < \bar{\varepsilon} < 1$, which is clear.

Abstract
In this paper we show a fantastic result. First we thought that we are not able to proof it, but then we found the connection to modular forms, and we were able to obtain a proof. I first attempted to build with analytic measure theory the proof, but this didn't work. However, the right framework is presented by modular forms. Our proof shows that it is true that $\mathcal{O}(\mathcal{P}) \sim \mathcal{H}(\mathcal{G})^{-1}$.

The following Theorem of Poincare and Bendixson is absolutely brilliant, and I even understood the proof. How did they come up with this?

Theorem: A planar system has no chaos. What I mean is that each orbit of a planar dynamical system can have property (i) or (ii) or (iii) for it's ω-limit set.

(i) A steady state it is.

(ii) A periodic orbit it might be

(iii) a connection of heteroclinic and homoclinic orbits it could be as well.

Of course, the orbit has to be bounded, obviously.