**Lemon Garlic Shrimp Pasta Recipe**

Ingredients: - 8 oz pasta (fettuccine) - 1 lb large shrimp, peeled and deveined - 2 cloves garlic, minced - 2 tbsp olive oil - 2 tbsp lemon juice - 1 cup chicken broth - Salt and pepper to taste - Grated Parmesan cheese (optional)

Instructions:

1. Cook the pasta according to package instructions.
2. In a separate pan, heat the olive oil over medium-high heat.
3. Add shrimp and garlic; sauté for 2-3 minutes or until pink and cooked through.
4. Stir in lemon juice and chicken broth.
5. Combine cooked pasta and shrimp mixture.
6. Season with salt and pepper to taste.
7. Serve hot, topped with Parmesan cheese if desired.

**Cooling Time Calculation using Derivatives**

Let’s calculate the average cooling time of the dish after it is removed from the heat source (stovetop). We’ll use a simple model that assumes the cooling rate is proportional to the temperature difference between the dish and the surrounding environment.

where:

* is the temperature of the dish (°F)
* is time (min)
* is a cooling constant (1/min)
* is the surrounding temperature (°F)

We can solve this differential equation using separation of variables and integration.

where:

* is the initial temperature (°F)
* is the final temperature (°F)
* is the cooling time (min)

Simplifying and solving for , we get:

Assuming an initial temperature of 180°F, a surrounding temperature of 70°F, and a final temperature of 80°F (after cooling), we can plug in the values:

This means that on average, it will take approximately 14.5 minutes for the dish to cool down from 180°F to 80°F after being removed from the heat source.

**Note:** This calculation is a simplified model and actual cooling times may vary depending on various factors such as air circulation, container material, and ambient temperature.