1. The Republic of Bob has determined that their Lorentz curve is given by $L(x) = 0.86x^2 + 0.14x$. Find the Gini Index. SHOW YOUR WORK!

   The Gini index is $1 - 2 \int_0^1 L(x)\,dx$. First, we'll compute the integral.

   ALPHA: `int 0.86x^2+0.14x from x=0 to 1`

   This gives us 0.356667. Then, plug that into the formula for the Gini index:

   ALPHA: `1 - 2(0.356667)`

   **Answer:** The Gini index is approximately 0.287.

2. Suppose the $C'(q) = 2q^2 - 50q + 300$. We also know that the cost when $q = 1$ is \$40. Find $C(q)$.

   We need to find an antiderivative of $C'(q)$. So we need to compute the indefinite integral of $C'(q)$.

   ALPHA: `int 2q^2-50q+300`

   So we find that $C(q) = 1/3q(2q^2 - 75q + 900) + c$. To find $c$ we need to use the fact that $C(1) = 40$. Plug 1 into for $q$ and set this equal to 40.

   ALPHA: `1/3 q (2 q^2-75 q+900) + c at q=1`　　　　ALPHA: `c+827/3 = 40`

   So $c = -707/3 \approx -235.667$

   **Answer:** $C(q) = 1/3q(2q^2 - 75q + 900) - 235.667$　　or　　$C(q) = 2/3q^3 - 25q + 300q - 235.667$

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1. The Republic of Bob has determined that their Lorentz curve is given by $L(x) = 0.943x^2 + 0.057x$. Find the Gini Index.

   The Gini index is $1 - 2 \int_0^1 L(x)\,dx$. First, we'll compute the integral.

   ALPHA: `int 0.943x^2+0.057x from x=0 to 1`

   This gives us 0.342833. Then, plug that into the formula for the Gini index:

   ALPHA: `1 - 2(0.342833)`

   **Answer:** The Gini index is approximately 0.314.

2. Suppose the $C'(q) = 1.5q^2 - 40q + 900$. We also know that the cost when $q = 5$ is \$100. Find $C(q)$. SHOW YOUR WORK!

   We need to find an antiderivative of $C'(q)$. So we need to compute the indefinite integral of $C'(q)$.

   ALPHA: `int 1.5q^2-40q+900`

   So we find that $C(q) = q(0.5q^2 - 20.q + 900.) + c$. To find $c$ we need to use the fact that $C(5) = 100$. Plug 5 into for $q$ and set this equal to 100.

   ALPHA: `q (0.5 q^2-20. q+900.) + c at q=5`　　　　ALPHA: `c+4062.5 = 100`

   So $c = -3962.5$

   **Answer:** $C(q) = q(0.5q^2 - 20q + 900) - 3962.5$　　or　　$C(q) = 0.5q^3 - 20q^2 + 900q - 3962.5$