

MAT 263 Test 4

1. Determine the anti-derivative of each of the following:

a. $\int 3x^2 + 4x - 1 dx$

b. $\int 3e^{4x} dx$

c. $\int \frac{3}{4x^3} dx$

2. Evaluate each of the following definite integrals:

a. $\int_0^2 3 - x^2 dx$

b. $\int_0^2 1 - 2e^x dx$

c. $\int_1^5 dx$

3. Through some marketing research, Megadodo Publications knows that its best-selling book "The Hitchhikers Guide to the Galaxy" has the demand function $D(p) = 300 - p^2$ where p is the price of the book and D is the daily U.S. demand.
- Find the Elasticity of Demand, $E(p)$, for this book.
 - If the current price of the book is \$5 determine if the demand is elastic or inelastic.
 - In order to raise revenue, should Megadodo Publishing raise or lower the price?
4. Suppose for a certain product the demand function is $D(x) = 600 - 10x^2$ and the supply function is $S(x) = 40x$.
- Determine the equilibrium point.
 - Determine the consumer's surplus.
 - Determine the supplier's surplus.
5. A company marginal cost function is $MC(x) = 20x^{1.5} - 15x^{2/3} + 1$, where x is the number of units, and fixed costs are \$4000. Find the cost function. Hint: Find the anti-derivative.
6. Find the Gini index for the Lorenz curve $L(x) = x^3$ (The Lorenz curve for U.S. income in 1935).
Hint: The Gini coefficient is a measure of inequality of a distribution. It is defined as a ratio with values between 0 and 1: the numerator is the area between the Lorenz curve of the distribution and the uniform distribution line; the denominator is the area under the uniform distribution line. It was developed by the Italian statistician Corrado Gini and published in his 1912 paper "Variabilità e mutabilità" ("Variability and Mutability"). The Gini index is the Gini coefficient expressed as a percentage, and is equal to the Gini coefficient multiplied by 100. (The Gini coefficient is equal to half of the relative mean difference.)

The Gini coefficient is often used to measure income inequality. Here, 0 corresponds to perfect income equality (i.e. everyone has the same income) and 1 corresponds to perfect income inequality (i.e. one person has all the income, while everyone else has zero income).

The Gini coefficient can also be used to measure wealth inequality. This use requires that no one has a negative net wealth. It is also commonly used for the measurement of discriminatory power of rating systems in the credit risk management.

Formula to use: $G = 1 - 2 \int_0^1 L(x)dx$

