Instructions:

• You have **55 minutes** to complete this exam. It consists of 7 questions on 8 pages including this cover sheet and is worth a total of 100 points. The value of each question is listed below and with each question. Partial credit might not be awarded on some questions.

• You may not use any books or notes during this exam.

• Calculators are permitted EXCEPT those calculators that have symbolic algebra or calculus capabilities. In particular, the following calculators and their upgrades are not permitted: TI-89, TI-92, and HP-49. In addition, neither PDAs, laptops nor cell phones are permitted.

• Make sure to read each question carefully.

• Please **write clearly** and make sure to **justify your answers**. Correct answers with no supporting work may receive no credit. Unless otherwise stated, solutions found by graphing will receive no credit.

• Unless otherwise specified, make sure your answers are in **exact form** (i.e. not decimal approximations).

• Please write your answers on the indicated lines.

• A random sample of graded exams will be xeroxed before being returned.

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(1). (15 points) A retailer currently sells 32 notebook computers per day at a price of $480. Market research indicates that for each $6 reduction in price, 8 more notebook computers per day would be sold.

(a) (13 points) How much should the retailer charge in order to maximize their daily revenue?

Answer (1a): Revenue maximizing price: __________________________

(b) (2 points) What is the maximum daily revenue?

Answer (1b): Maximum daily revenue: __________________________
(2). (21 points) Find the indefinite integrals. You DO NOT need to simplify your answers.

(a) (7 points) \[ \int \frac{\ln x}{5x} \, dx \]

Answer (2a): ________________

(b) (7 points) \[ \int 5^{7x} \, dx \]

Answer (2b): ________________
(Problem (2) cont.)

(c) (7 points) \[ \int \frac{y^5 + 3}{y^6 + 18y + 1} \, dy \]

Answer (2c): ________________

(3). (10 points) Suppose that
\[
\frac{dr}{dq} = 0.12q^2 - 1.8q + 6.5
\]
is a marginal-revenue function. Find the demand function.

Answer (3): ________________
(4). (13 points) Given the region in the first quadrant that is bounded by the given curves:

\[ f(x) = x^2 + 3, \quad y = 0, \quad x = 4, \quad x = 12 \]

(a) (10 points) Approximate the area of the region by using four rectangles of identical width (ie. find the sum \( S_4 \)). Use the right-hand endpoint of each subinterval.

Answer (4a): \( S_4 = \) ____________________________

(b) (3 points) Write down, but DO NOT EVALUATE, an integral which gives the EXACT area of this region.

Answer (4b): Area = ____________________________
(5). (18 points) Evaluate the definite integral. Please give the EXACT value of each integral.

(a) (9 points) \[ \int_{1}^{6} 3\sqrt{67-3t} \, dt \]

Answer (5a): _______________________

(b) (9 points) \[ \int_{1}^{2} 6x^{-5} \, dx \]

Answer (5b): _______________________
(6). (9 points) Set-up, but DO NOT EVALUATE, an integral to find the area of the region bounded by the given curves. Be sure to find any needed points of intersection.

\[ y = x^2 - 5x - 3, \quad y = 7 - 2x \]

Answer (6): 

(7). (14 points) The demand equation for a product is

\[ p = 19.8 - 0.6q \]

and the supply equation is

\[ p = 3.8 + 1.4q \]

(a) (3 points) Find the equilibrium point \((q_0, p_0)\).

Answer (7a): \( q_0 = \) ______________________

\( p_0 = \) ______________________

(b) (11 points) Determine the consumers’ surplus under market equilibrium.

Answer (7b): Consumers’ surplus: ______________________