Simon Fraser University
Department of Economics

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Econ 201, Spring 2021

Final Exam (April 23, 2021)

This is a **closed book** examination. No notes, electronic devices or external help are allowed. You can use only **paper** and pencil/pen to write the exam. You can use a phone to scan/photo the exam only after you are finished.

A simple non-programable calculator is allowed.

Please **always explain** how you obtained your answers – no credit will be given for numerical answers without explanation even if correct.

There are **100 POINTS** in total. You have **130 minutes**.

By moving to the next page you acknowledge that you have read and are familiar with the SFU Academic Integrity Policy regarding what constitutes plagiarism and academic dishonesty in examinations ('cheating').

SFU Academic Integrity Policy

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I. TRUE or FALSE (5 pts each) – no points given for correct answers without explanation

1. If, after a price change, both the income and substitution effects reduce the quantity demanded of a good, then this good is normal.

2. A quantity tax results in a higher market price paid by consumers if the demand curve is downward sloping.

3. Profit maximization means maximizing total revenue minus total costs.

4. The result that all firms make zero profits in a long-run industry equilibrium implies that the firms' employees are indifferent between producing and shutting the firm down.

5. A competitive firm would always optimally produce the output level at which marginal cost equals the output price.

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Problem 1 (25 pts)

Bob always spends $1/3$ of his income m on food, with quantity x_1 and price p_1 per unit. He spends the remaining part of his income on "all other goods", with quantity x_2 and price p_2.

(a) Explain that Bob's demand function for food equals $x_1^*(p_1, p_2, m) = \frac{m}{3p_1}$. Find Bob's demand function for all other goods, $x_2^*(p_1, p_2, m)$. Is food a normal good for Bob? Are 'all other goods' ordinary or Giffen for Bob? Explain.

From now on use that Bob's income is $m = \$90$ *and* $p_2 = \$1$.

(b) Suppose $p_1 = \$3$. Put food on the horizontal axis and plot Bob's budget set and find his optimal consumption bundle.

(c) Let $p_1 = \$3$ still but suppose a store offers Bob a one-time $\$18$ coupon redeemable for any good he wants after purchasing his first $\$30$ worth of food (no coupon if he purchases less than \$30 of food; no additional coupons if he purchases more). Plot Bob's budget set after the coupon offer and find his new optimal consumption choice.

(d) Suppose instead the government subsidizes food which reduces p_1 to $\$2$ per unit (there is no coupon). If Bob's income remains $m = \$90$, find the income and substitution effects (IE and SE) of the food price change on Bob's quantity demanded of food. Explain the direction of the IE and SE. Is Bob better off or worse off after the subsidy? Explain why or why not.

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Problem 2 (25 pts)

There are 30 identical consumers in the daily competitive market for cheese sandwiches in a small town, each of whom has income $m = \$10$ and the demand function $x^*(p, m) = m - p$. There are 10 sandwich sellers, each of whom has the supply function $y^*(p) = 2p$ where p is the price of a sandwich.

(a) Find the *market demand function* for sandwiches $q^D(p)$ and the *market supply function* $q^S(p)$. Plot the market demand curve and the market supply curve on a graph with p on the vertical axis. Label your graph and intercepts clearly.

(b) Find the equilibrium number of sandwiches sold, q^* and the equilibrium price, p^*. How much is the consumers' surplus? How much is the producers' surplus?

(c) Find the price elasticity of market demand at the equilibrium price and quantity in (b).

(d) Suppose now the government puts a 20% tax on sandwiches (that is, the consumers pay 20% more over the price producers receive). Find the new equilibrium quantity, the price p^D paid by consumers and the price p^S received by producers at the after-tax equilibrium. Write an expression that can be used to calculate the tax revenue that the government collects (*no need to find the exact number*).

(e) Suppose now that there is **no tax** but there is a shortage of cheese and so the maximum amount of sandwiches that can be made is 90 (for quantities lower than 90 the market supply curve is the same as in part a). Plot the market supply and demand curves. What would be the new sandwich price and total quantity sold in equilibrium? How do the consumers' surplus and producers' surplus compare to their values in part (b)? Do sellers earn *economic rent* at the new equilibrium? Explain.

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Problem 3 (25 pts)

Firm X has the long-run cost function $c(y) = y^3 - 6y^2 + 12y$ where y is the output level.

(a) Find the firm's average cost function and average variable cost function.

(b) Show that the firm's marginal cost function is $MC(y) = 3(y-2)^2$ and use this together with your results in part (a) to find firm X's *supply function* for any output price $p > 0$.

(c) Suppose there are exactly 10 firms identical to firm X in this industry and the market demand function is $120 - 10\sqrt{\frac{p}{3}}$. Find the equilibrium price and quantity when the number of firms is **fixed at 10**. How much does each firm produce? How much is each firm's profit or loss per unit sold?

(d) Suppose now there is **free entry and exit** in this industry. How many firms will produce in the long-run industry equilibrium? How much output will each firm produce? How much output will be produced in total? What will be the equilibrium price? *(the answers can be fractions)*

(e) Explain in words or using a graph only (no calculations needed) what will happen in this industry if, starting from the equilibrium in (d) the government imposes a *price floor* of \$10 (that is, no firm is allowed to sell for less than \$10 per unit).