Name:

Make-up Quiz #1.
Material Covered. Klein 1, 2; Schaums 1, 2

1. Solve the following system of equations for x, y and z:

$$x/2 + y/4 + z = 4$$
$$(x + y) / 3 = 1$$
$$x + y + z = 6$$

2. Which of the following is the ECONOMISTS inverse of the function $y = 2x^{-1/3}$
(i.e. – find x as a function of y, x = f(y))

a) $x = 2/y^{1/3}$ b) $x = 8y^{-3}$ c) $x = 4y^{3}$ d) $x = 4y^{-1/3}$ e) $x = 3/(y^{1/8})$

3. Consider the following supply and demand functions in the Market for Widgets:

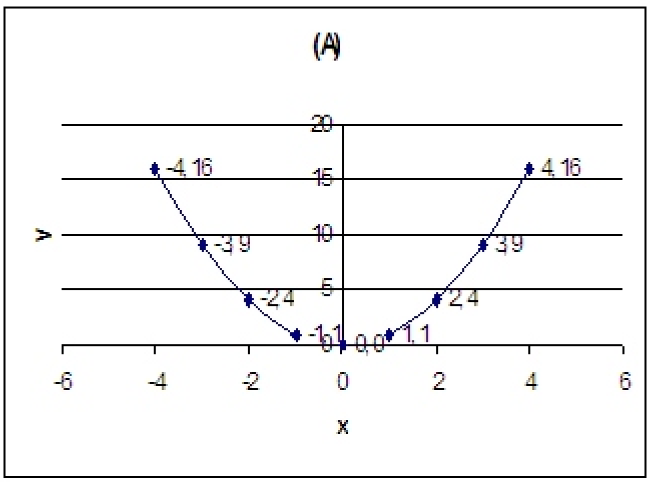
Demand: $Q_d = 9 - P^2$

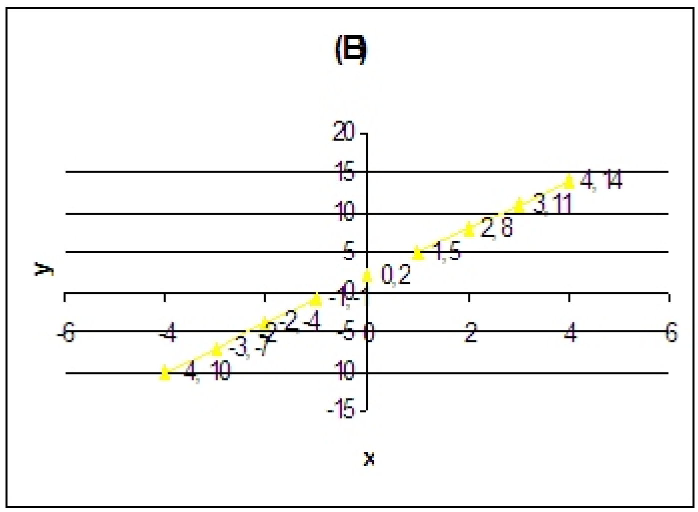
Supply: $P = 2$

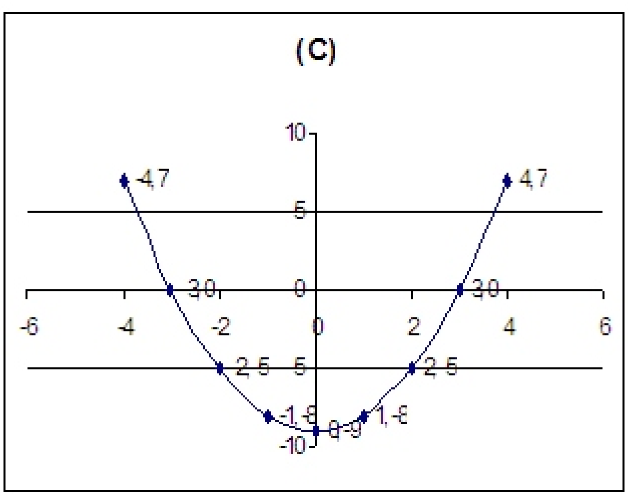
Find the equilibrium Quantity and Price.

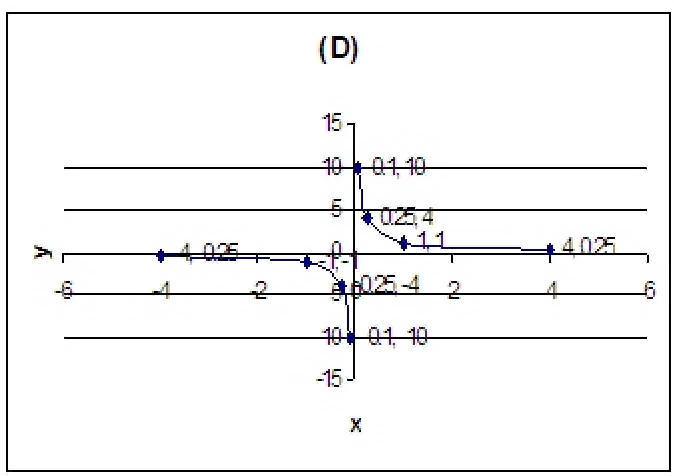
4. (Worth 4 points) Match the following four functions with their graphs:

i. $y = x^2 - 9$ ii. $y = x^2$ iii. $y = 1/x$ iv. $y = 3x + 2$









Name:

Make-up Quiz 2: Schaum's 7, 8 (Exponents and Logs, interest compounding), Klein

1. Solve for x: $e^x = 12.5^{x+3}$

2. Which of the following is equivalent to y if ln y = ln(8) – 3ln(x)

a) $y = \ln(8x^3)$ b) $y = 8x^3$ c) $y = 8/x^3$ d) $y = e^{8x^3}$ e) $\ln y = 8xe^{-3}$

3. $\text{Log}_2\ 64 =$

a) 1 b) 2 c) 3 d) 4 e) 5 f) 6

4. You have an investment which is growing at 25% per year, compounded continuously. If the investment is worth $100 on January 1, 2004, what will it be worth on January 1, 2005.

a) 118.40 a) 125.00 b) 128.40 c) 148.40 d) 100.00

5. In 1980 an ounce of gold cost about $600, today (24 years later) a pound of gold costs about $400. What was the annual average rate of growth, compounded continously (hint – You can use the ordinary growth formula, but your answer will be < 0, because we have had negative growth = shrinkage).

Name

Make-up Quiz 3: Schaums 3, Klein

1. Find the first and second derivatives of $y = (5x^3 - 7x^2)^2$

2. Consider the function $y = 1/x$ over the interval $-\infty < x < 0$, the negative values of x

.

a) is the function continuous over this interval ($-\infty < x < 0$) (explain)?

b) is the function convex or concave over the interval (explain)?

3. For which values of x is the first derivative of the following functions NOT defined:

a) $y = (1/x^2)$

b) $y = | x - 3 |$

4. Given the function $f(x) = 2x^2 – 3x$, find the first, second, third and fourth derivatives.

5. Given the functions $z = 13y^2$ and $y = x – 1/x$, find dz/dx

Name:

Make-up Quiz 4: Schaum's 4, 9

1. Find the first and second derivative for the following function:

$$f(x) = \ln(2x) + e^{2x}$$

2. Consider the function $f(x) = (16/3)x^3 - 4x$

a) Find the critical points. Remember, a point has two coordinates $(x^*, f(x^*))$

b) For each point, determine if it is a local maximum or a local minimum.

3. For the Total Cost Function $TC(q) = q^3 - q^2 + 100q$, find the Average Cost and the Marginal Cost functions.

4. For the Total Cost function question 3, find the **minimum average cost** and the level of q at which this minimum average cost is achieved.

5. A monopolist which sells good x has the profit function:

$\pi(x) = (10 - x)x - 2x$ Where x = quantity produced

Find the profit maximizing output, x_M, and the monopoly profit, $\pi(x_M)$

Name:

Make-up Quiz 5: 3, 7, and 9 (Review Quiz)

Consider the following Demand and Supply functions:

Demand: $Q = 1/(2P) = (2P)^{-1}$ for $P > 0$
Supply $P = MC = AC = 0.25$

1. Find the market clearing Price and Quanity, P* and Q*.

2. Find the Price Elasticity of Demand as a function of P.
Hint: The formula for elasticity is $\epsilon = dQ/dP * (P/Q)$

3. Is the demand function $Q = 1/(2P) = (2P)^{-1}$ convex or concave in P? Explain.

4. What is the domain and what is the range of the function $f(x) = \ln(-x)$

5. On January 1, 2004 Alan invests \$100.00 at 5% interest per year, Betty invests \$50.00 at 9% interest per year, both interest rates are compounded continuously. In how many years will the value of Betty's investment = the value of Alan's investment?

Name:

Make-up Quiz 6: Schaum's 4, 8 and 9 (a review of economic applications)

1. Find the first and second derivative for the function $y = 7^{1/3}x^{2/3}$

2. When Tommy entered college his parents promised him 20,000 when he graduated. Tommy can finish college in 4 years, or he can relax (take fewer classes) and finish in 5 years. If the current interest rate (compounded continuously) is 5% per year, how does the PRESENT value of the promised 20,000 change if Tommy graduates in 5 years instead of 4?

3. (4 points) Find the critical point(s) and determine if it or they are minima, maxima, or neither. Explain your answer.

a) $f(x) = x^2$

b) $g(x) = x^3$

(If the second derivative doesn't give the answer, try sketching the function.)

4. If $y = \ln(x^2)$ and $z = 2y$, what is dz/dx?

Name:

Make-up Quiz 7: Schaums' Chapters 5 and 6: (Calculus of Multivariable Functions)

1. (4 points) Given the function:

$$z = e^{xy} - \ln(xy)$$

a) Find the two first partial derivatives.

b) Find the four second partial derivatives

2. Given the Production Function $Q = 25K^{0.4}L^{0.6}$

Find the Marginal Product of Labor and the Marginal Product of Capital.

3. Given the profit function $\pi = 25x - x^2 - xy - 2y^2 + 30y - 28$

Find the quantities of x and y that maximize profits.

4. Find the limit of function $z = e^{-xy}$ as x and y go to infinity: $\lim_{x, y \to \infty} 1/e^{xy}$

Name:

Make-up Quiz 8: Schaum's 5 and 6 (Especially 6, focus on applications)

1. (4 points) A monopolist sells two products, x and y, with the inverse demand functions:

$p_x = 10 - x$

$p_y = 4 - y/3$

and the combined cost function is $c = x^2 + xy + y^2 + 10$

a) What is the monopolist's Profit function?

b) What are the values of x and y which maximize profits.

2. Given the production function $q = 2L^2K + 3K$, what is the Labor elasticity of output.

Remember, the elasticity of a function f(x,y) with respect to x = $\epsilon_{y,x} = \partial f/\partial x * (x/f(x))$

3. Which of the following functions exhibits constant returns to scale (doubling all inputs exactly doubles outputs)

a) $Q = 10KL$ b) $Q = 10K^{1/2}L^{1/2}$ c) $Q = 2K + 3L$ d) $Q = 2L^2K + 3K$

Consider the standard equation for constant percent growth:

$V(P,r,t) = Pe^{rt}$ Where V = Value at t years in the future
P = Principal invested today
r = percent rate of growth

4. Find the three first partials:

$\partial V/\partial P =$

$\partial V/\partial r =$

$\partial V/\partial t =$

5. Why can't you find $\partial V/\partial e$?

Name

Make-up Quiz 9: Schaum's 5 and 6 Optimization

1. Consider the function $z = x^2 + xy - 3y$

Find the critical points for this function and identify them as minima or maxima or saddles or cannot determine.

2. For which of the following functions is $(x, y, z) = (0, 0, 17)$ a critical point?

a) $z = x + y + 17$ b) $z = x^2 + y^2 + 17$ c) $z = \ln(17x^2y^2)$

3. Given the demand function for cookies:

$Q_C = 10 - P_C - 0.5P_M$

Where Q_C = quantity of cookies
P_C = price of cookies
P_M = price of milk

What is the elasticity of demand for cookies with respect to the price of cookies and the elasticity of demand for cookies with respect to the price of milk?

4. Consider the function $z = exy - e^x - ey$

Find the critical point(s) for this function and identify them as minima or maxima or saddles or cannot determine.

NOTE – exy and ey are not typos. Remember e is a number, approximately equal to 2.71

Name

Make-up Quiz 10: Schaum's Chapters 5 and 6 – constrained optimization

1. Constrained optimization – a firm manufactures two goods, x and y. The total cost function is:

$$TC = x^2 + 4y^2 - 2xy + 100$$

The firm has a contract to produce 10 units of output:

$$x + y = 10$$

Using a Lagrangian, find the quantities of x* and y* which will minimize production costs. What is the value of the "shadow price" λ* at x* and y*.

$\mathcal{L} =$

f.o.c.:

$\partial\mathcal{L} / \partial x =$
$\partial\mathcal{L} / \partial y =$
$\partial\mathcal{L} / \partial\lambda =$

$x^* =$
$y^* =$
$\lambda^* =$

2. Two inputs are used to produce coffee, capital (coffee makers, cups, etc.) and labor.
The production function for coffee is: $q = 12\ K^{1/4}\ L^{3/4}$

Where K = quantity of capital required
L = quantity of Labor required, and
q = number of cups of coffee produced per hour
The current WAGE (price of labor) is w = $1.00 per hour.
The current RENTAL rate for one unit of capital is v = $0.50 per hour.

The coffee shop owner wants MINIMIZE total COSTS while keeping her TOTAL OUTPUT at $q \geq 192$ cups per hour.

A. Find the "objective function" and the "constraint" and set up the Lagrangian:
Objective Function:
Constraint:
Lagrangian: $\mathcal{L} =$

B. Find the quantities of K and L and that maximize output, subject to the constraint.

3. If Total Revenue and Total Costs are simply functions of output, q, do you need to use a Lagrangian to solve for the maximum profit? (Explain)