Econ300 Second Midterm Exam
Spring 2013 version W Answers

This exam consists of 25 multiple choice questions. The maximum duration of the exam is 50 minutes.

1. In the spaces provided on the scantron, write your last name, then your first name, and also be sure to include university identification number.

2. Also fill in the bubbles below your name and id number.

3. Write your name here: _____

4. In the "special codes" section of the scantron under "K" write the letter W

5. DO NOT OPEN this exam booklet until you are told to do so and STOP writing when you are told that the exam is over. Failure to comply will result in a 10% loss in the grade.

6. You **MUST** return this exam booklet with the scantron; otherwise no credit will be awarded.

7. Only the answers you provide on the scantron will be counted towards your grade.

8. Please make sure you use dark pencil marks to indicate your answer; the scantron reader may not give you credit for an answer if it cannot detect it.

10. Choose the single best possible answer for each question.

You are responsible for upholding the University of Maryland Honor Code while taking this exam.

1. Suppose $f(x,y) = \ln(x + e^{xy}) + 4x^2 y^{\frac{1}{3}}$. Find the partial derivative of *f(x, y)* with respect to *x*.

   A. $\frac{1+ye^{xy}}{x+e^{xy}} + 8xy^{\frac{1}{3}}$

   B. $\frac{1+e^{xy}}{xy+e^{xy}} + 8xy^{\frac{1}{3}}$

   C. $\frac{1+ye^{xy}}{1+e^{-x+y}} + 8x + y^{\frac{1}{3}}$

   D. $\frac{1+ye^{xy}}{y+e^{xy}} + \frac{8}{3}xy^{\frac{2}{3}}$

   E. None of the above

2. Suppose $f(x,y) = \ln(x + y) + e^{x^2 y}$. Find $f_{12}(x,y)$?

   A. $-(x+y)^{-3} + e^{xy}y + e^{xy}$

   B. $-(x+y)^{-2} + e^{xy}xy + e^{xy}$

   C. $-(x+y)^{-2} + xy + e^{xy}$

   D. $-(x+y)^{-2} + e^{xy}x + e^{x}$

   E. None of the above

3. Which of the following statements is correct when a production function is $f(K,L) = 20(\ln K + \ln L)$

   A. Marginal product of labor declines with more labor, holding capital fixed

   B. Marginal product of capital increases with more capital, holding labor fixed

   C. Constant returns to scale.

   D. All of the above

   E. None of the above

4. Utility function is given by $u(x,y) = \ln(x) + y^{\frac{1}{2}}$. Find the MRS of *x* for *y* when *x*=1, *y*=4

   A. -4

   B. -3

   C. -2

   D. -1

   E. 0

5. Utility function is given by $u(x,y) = \ln(x) + \ln(x+y)$. Which of the following statements is correct?

   A. Marginal utility of x is increasing

   B. Utility curve is convex in y

   C. Utility is minimized when $x = 1$ and $y = 2$

   D. All of above

   E. None of the above

6. Suppose $f_K = 2$ and $f_L = 2$ whenever K=1 and L=2. If a production function $f(L, K)$ is homogeneous degree of 1, what is the corresponding output level when K=1 and L=2.

A. 3
B. 4
C. 5
D. 6
E. None of the above

7. Suppose the demand curve of a baseball ticket is given by $\mathrm{Q} = e^{4-\ln p}$. What is the price elasticity of demand whenever Q=13.459

A. 2.27
B. -1.03
C. -1
D. 2
E. -2

8. Suppose $\mathrm{F}(x, y) = \ln(x^3 + y) + xy^{\frac{3}{2}} = 0$. Find $\frac{dy}{dx}$ when x=1 and y=0.

A. -3
B. -2
C. 0
D. 1
E. 2

9. A monopolist selects output to maximize profits. Then

A. output will minimize total cost
B. output will be on the elastic portion of the demand curve
C. output will be on the inelastic portion of the demand curve
D. output will be such that profit is locally convex
E. None of the above

10. Which of the following functions is homogeneous degree 3?

A. $f(x,y) = \ln(x^3 + y) + xy^{\frac{1}{2}}$
B. $f(x,y) = xy^{\frac{1}{2}}$
C. $f(x,y) = \ln(x^3) + xy^{\frac{1}{2}}$
D. $f(x,y) = xy^4$
E. $f(x,y) = xy^2$

11. Suppose $q = x^2y^2 + z$, $x = 2k$, $y = e^k$, and $z = ln\ k$. Which of the following statements is correct?

A. $\frac{dq}{dk} = 4xy^2 + 2x^2ye^k + \frac{1}{k}$
B. $\frac{dq}{dk}$ is not properly defined whenever *k*=0
C. q does not have a local maximum.
D. None of the above
E. All of the above

12. Suppose you run a business. Your objective is to maximize the profit by using the optimal amount of the capital *k* and labor *L*. Production function is given by $f(k, L) = ln\ k + ln\ L$. You pay rental rate *r* and wage *w* per capital and labor respectively. Price of the output is *p*. You take *p*, *r* and *w* as given. Which of the following statements is correct?

A. Optimal level of $k = \frac{p}{r}$
B. Optimal level of $L = \frac{r}{w}$
C. Optimal level of *k* decreases as wage *w* increases
D. All of the above
E. None of the above

13. Suppose $f(x) = \frac{1}{3}x^3 - \frac{3}{2}x^2 + 2x + 1$. How many inflection points does this function have?

A. 0
B. 1
C. 2
D. 3
E. 4

14. Which of the following functions has either local maximum or minimum?

A. $f(x) = \ln(x)$ defined on x > 0
B. $f(x) = e^x$
C. $f(x) = x^{\frac{1}{2}}$ defined on $x > 0$
D. $f(x) = \frac{1}{x}$ defined on $x > 0$
E. $f(x) = -\frac{3}{2}x^2$

15. Utility function is given by $u(c) = \frac{1}{b}c^b$. What is the required condition for *b* so that we have a diminishing marginal utility?

A. $b > 0$
B. $1 < b < 2$
C. $b = 1$
D. $b < 1$
E. None of the above

16. If, $y = \ln(e^{e^x})$

A. $y' = 2x$
B. $y' = 2$
C. $y' = e^x$
D. $y = \ln(e^x)$
E. None of the above

For questions 17-20: The function is given by $f(x, y) = 4\ln(x) - 2x^2 + y^3 - 12y$

17. How many stationary points does *f*(*x*,*y*) have?

A. 0
B. 1
C. 2
D. 3
E. 4

18. Evaluate $f_{xx}f_{yy} - {f_{xy}}^2$ at (1, 2)

A. -96
B. 96
C. 0
D. 1
E. None of the above

19. Which of the following is correct?

A. *f*(*x*) is locally maximized at (1, -2).
B. *f*(*x*) is locally minimized at (1, -2)
C. *f*(*x*) had a saddle point at (1, -2)
D. All of the above
E. None of the above

20. Which of the following is correct?

A. *f*(*x*) is locally maximized at (1, 2)
B. *f*(*x*) is locally minimized at (1, 2)
C. *f*(*x*) has a saddle point at (1, 2)
D. All of the above
E. None of the above

21. Suppose a ***convex*** function *f(x)* is everywhere differentiable. Further assume that $f'(x) = 0$, when $x=x^*$. Which of the following statements is correct?

A. *f(x)* is minimized when $x=x^*$
B. *f(x)* is maximized $x=x^*$
C. *f(x)* has neither maximum nor minimum when $x=x^*$
D. $x=x^*$ is an inflection point
E. None of the above

22. Suppose a function *f*(*x*) is everywhere differentiable and is locally maximized when $x=x^*$. Which of the following statements is correct?

A. *f*(*x*) is a convex function
B. $f''(x^*) < 0$
C. $f'(x^*) > 0$
D. All of the above
E. None of the above

23. Suppose a function $f(x) = \frac{1}{4}x^4 + \frac{2}{3}x^3 + \frac{1}{2}x^2 + 1$. Which statement is correct?

A. $f(x)$ has three stationary points
B. $f(x)$ is either maximized or minimized at all the stationary points
C. $f(x)$ does not have a local minimum
D. All of the above
E. None of the above

24. Which of the following statements is correct for the function $f(x) = \ln(x) + \frac{1}{x}$

A. $f(x)$ is locally minimized at $x = 2$
B. $f(x)$ is locally maximized at $x = 2$
C. $f(x)$ is locally minimized at $x = 1$
D. $f(x)$ is locally maximized at $x = 1$
E. None of the above

25. Suppose the total tax revenue $R(t) = -0.5t^2 + 10t + 50$ where *t* denotes the tax rate. Assume that the **current tax rate *t* = 0.38**. As a policy maker, you want to measure the marginal effect of a tax increase to the total tax revenue $R(t)$. Which of the following statement is correct?

A. Total revenue remains constant in response to the marginal increase in tax rate
B. Total revenue increases in response to the marginal increase in tax rate
C. Total revenue decreases in response to the marginal increase in tax rate
D. All of the above
E. None of the above