Name ______________________________ Student ID ______________

Prince of Songkla University
Department of Industrial Engineering, Faculty of Engineering

Final Term Examination: Semester 2
Date: 26 April 2016
Subject: 227-504 Quantitative Analysis in Logistics and SCM

Academic Year: 2015
Time: 09:00-12:00
Room: R200

ทุจริตในการสอบ โทษขั้นต่ำ คือ ปรับตกในรายวิชาที่ทุจริต และพักการเรียนหนึ่งภาคการศึกษา

Instructions: Read carefully

1. All materials are allowed.
2. There are 5 problems. Do all of them. Also show your work clearly and legibly.
3. Answer the questions in this test paper, only.
4. You must write your name and your student ID in every page of the test.
5. Total score is 100 points.

Distribution of Score

Problem	Points	(a)	(b)	(c)	Points Gained
1	25	5	10	10	
2	15	-	-	-	
3	20	-	-	-	
4	20	7	-	13	
5	20	-	-	-	

Tests are prepared by
Nikorn Sirivongpaisal

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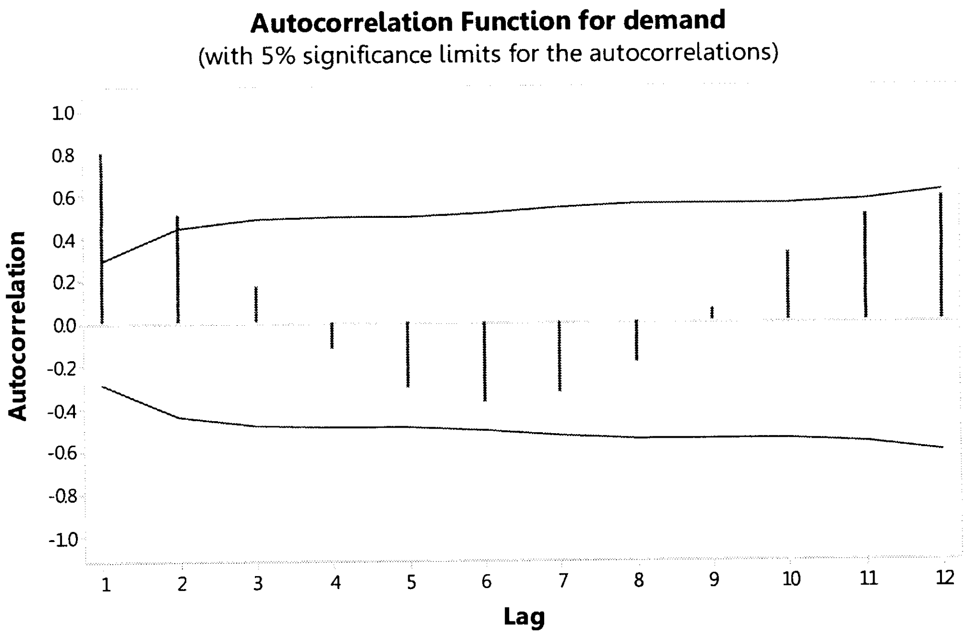
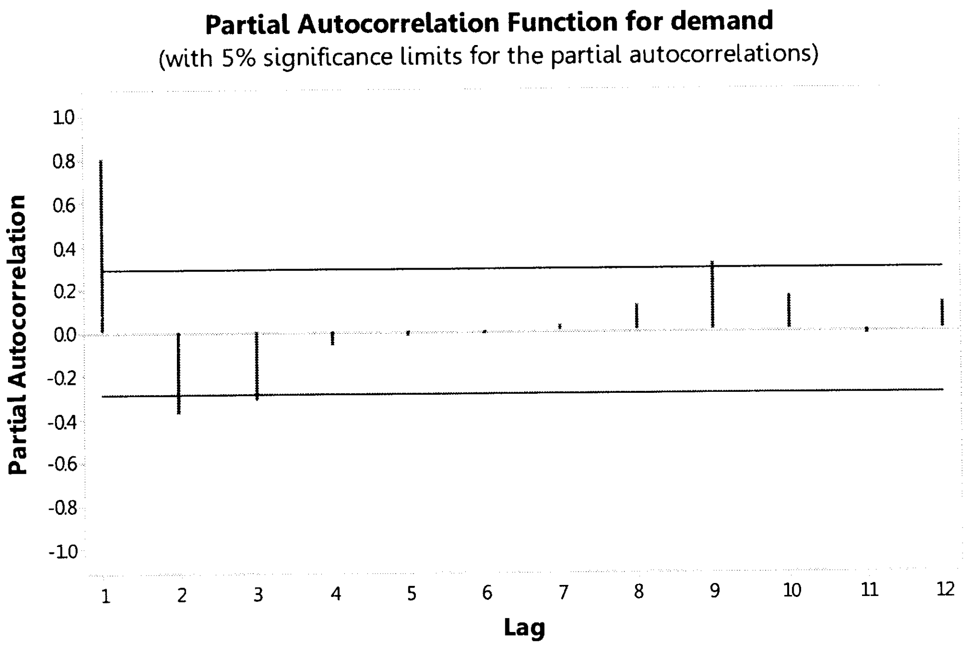
Problem 1: (25 points) Answer the following questions.

(a) **(5 points)** From the information provided below, identify the ARIMA model.





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(b) **(10 points)** From ARIMA model that you identified in Problem (a), forecast the future observations at time $T+\tau$ when $\tau = 1,2,3$. (You can leave the unknown parameters in your forecast without estimation)

(c) **(10 points)** Write the forecast function at time $T+\tau$ when $\tau = 2$ for the ARIMA (1,2,1) process.

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Problem 2: (15 points) Consider the following four items:

	Item			
	1	**2**	**3**	**4**
Demand/year	1,000	5,000	10,000	8,000
Ordering cost	\$6	\$10	\$10	\$8
Cost/unit	\$10	\$3	\$5	\$2
Floor space required	5.0 ft^2	1.0 ft^2	1.0 ft^2	1.5 ft^2

Assume that the annual inventory carrying cost rate is 0.10 and that 15,000 square feet (ft^2) of floor space are available. What is the optimal inventory policy for these items? Determine the cost of management inventory of having only 15,000 square feet of floor space.

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Problem 3: (20 points) A service station finds that its weekly sales of regular gasoline may be considered to be a normally distributed random variable with a mean of 2,000 gallons and a standard deviation of 200 gallons. It is able to replenish its stock only once each week, and there is no fixed cost for this. The shortage loss is estimated at \$0.04 per gallon and the storage cost for gas unsold at the end of the week is \$0.005 per gallon. Determine the optimal stock level that minimizes total cost.

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Problem 4: (20 points) The inventory of a purchased item is to be controlled with a continuous review (r, R) policy. Demand is distributed as poison random variable with a mean of 400 and a standard deviation of 30.

(a) **(7 points)** If a lot size of 1000 is to be used, find (r, R) policy in order to guarantee service level at 95%.

(b) **(13 points)** If all shortages are backordered at a cost of \$4 per unit, what should be the reorder point in order to minimize average annual cost?

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Problem 5: (20 points) From the following data

n	1	2	3	4	5
D_n	20	50	10	50	50
c_n	10	10	10	10	10
K_n	100	120	80	90	100
h_n	1	2	2	2	1

Find the optimum production quantity by using Wagner-Within Algorithm.

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