

NAME: .....

**IE 431 Midterm Exam**  
**STATISTICAL QUALITY CONTROL,**  
 Department of Industrial Engineering - King Abdul Aziz University  
**NO OUTSIDE PAPERS ALLOWED**

1. (12pts) Solve the following:

a) (2pts) **Briefly** define or explain the following:

	Term	Definition
1	Quality	
2	Value Added Activity	
3	6 $\sigma$ (Six Sigma) Methodology	
4	Control Chart	

b) (2.5pts) Classify **the way we work** (according to Conway's empirical study); giving an example for each classification.

	Class	%	Example
1			
2			
3			
4			
5			

c) (2.5pt) State the **stages of reengineering** and **briefly** describe each stage.

	Stage	What does it involve?
1		
2		
3		
4		
5		

d) (2pt) Compare the **old** and the **new** concepts of quality.

Respond to the statement:

"If you want good quality (Zero Defects) you have to pay dearly (\$ infinity)".

e) (3pt) Mark the following statements as True (T) or False (F) and **explain why**:

- i. Inspection improves quality: ( )  
.....
- ii. Quality product costs more: ( )  
.....
- iii. Reducing variation is easier than centering the process: ( )  
.....

2. (5pts) **Design** an appropriate control chart for the following data; **plot** the same data and **comment** on it.

Number of rejects	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>
(Lot size = 200)	25	36	21	14	277	3	33	22	20	24	30

3. (6pts) A company uses safety **shields** for its workers with lengths that are  $N\sim(60,4)$ . **Users** are  $N\sim(64,9)$ . For best fit, a person can only use a shield within  $\pm 1$ cm off his size. How many shields that are of **NO-USE** (considered waste)? Show your steps in detail.

**Hint:** For your analysis, use **only** the dimensions from 58 to 66; such that:

- Pads with sizes (58-60) form a group.
- Pads with sizes (60-62) form another group, ... and so on.

4. (7pts) An airline company provides a Health Insurance for its pilots. If pilots' health expenditure follow a "Semi-Bath-Tub" probability Distribution (Shown below).

**Use** the following Uniform Random numbers® given below to calculate the **Average Medical cost** paid by the insurance company if the costs per pilot for the **two** classes are: \$100K and \$500K, respectively.

R	.35	.14	.98	.70	.03
x					

