

MgtOp 340—Operations Management (Section 1)
Washington State University
Fall 2019
Problem Set #2—Handwritten Section
Solutions

1a. $L = TD^2$
 $54 = T(45.8 - 44.6)^2$
 $54 = T(1.2)^2$
 $54 = T(1.44)$
 $T = 54 / 1.44 = 37.5$

Thus, $L = 37.5D^2$

<u>Unit</u>	<u>Taguchi Cost</u>
1	$37.5(45.0 - 44.6)^2 = 37.5(0.4)^2 = 37.5(0.16) = \$6.00$
2	$37.5(43.5 - 44.6)^2 = 37.5(-1.1)^2 = 37.5(1.21) = \$45.38$
3	$37.5(44.4 - 44.6)^2 = 37.5(-0.2)^2 = 37.5(0.04) = \$1.50$
4	$37.5(44.9 - 44.6)^2 = 37.5(0.3)^2 = 37.5(0.09) = \$3.38$

Total cost = \$6.00 + \$45.38 + \$1.50 + \$3.38 = **\$56.26**

1b. $L = T|D|$
 $54 = T|45.8 - 44.6|$
 $54 = T|1.20|$
 $54 = T(1.20)$
 $T = 54 / 1.20 = 45$

Thus, $L = 45|D|$

<u>Unit</u>	<u>Taguchi Cost</u>
1	$45 45.0 - 44.6 = 45 0.4 = 45(0.4) = \$18.00$
2	$45 43.5 - 44.6 = 45 -1.1 = 45(1.1) = \$49.50$
3	$45 44.4 - 44.6 = 45 -0.2 = 45(0.2) = \$9.00$
4	$45 44.9 - 44.6 = 45 0.3 = 45(0.3) = \$13.50$

Total cost = \$18.00 + \$49.50 + \$9.00 + \$13.50 = **\$90.00**

2. Question 1. Solutions vary

Question 4. 93.2% of flights scanned = 1.5 points
63.5% of bags scanned = 2 points
89.6% of bags dropped within 20 minutes = 0 points
Outliers: 15 bags arriving longer than 25 minutes = 1 point

Total TTC = 1.5 + 2 + 0 + 1 = 4.5 points, so the new total equals **93.5**
(including the 10-point bonus)

3.

Sample	R_i	$\bar{x}_i$
1	$132 - 114 = 18$	$(125+126+122+132+114+117) / 6 = 736 / 6 = 122.67$
2	$140 - 100 = 40$	$(130+100+140+121+125+126) / 6 = 742 / 6 = 123.67$
3	$155 - 108 = 47$	$(110+155+129+118+142+108) / 6 = 762 / 6 = 127.00$

$$\bar{R} = (18 + 40 + 47) / 3 = 105 / 3 = 35$$

$$\bar{\bar{x}} = (122.67 + 123.67 + 127) / 3 = 373.34 / 3 = 124.45$$

a. $UCL_R = D_4 \bar{R} = 2.004(35) = 70.140$

$$LCL_R = D_3 \bar{R} = 0(35) = 0.000$$

b. $UCL_{\bar{x}} = \bar{\bar{x}} + (A_2 \bar{R}) = 124.45 + 0.483(35) = 124.45 + 16.905 = 141.355$

$$LCL_{\bar{x}} = \bar{\bar{x}} - (A_2 \bar{R}) = 124.45 - 0.483(35) = 124.45 - 16.905 = 107.545$$

c. Yes.