1. The time required for servicing transmissions is normally distributed with  = 45 minutes and  = 8

minutes. The service manager plans to have work begin on the transmission of a customer’s car 10

minutes after the car is dropped off and the customer is told that the car will be ready within 1 hour

from drop-off. What is the probability that the service manager cannot meet his commitment?

Answer : **B. 0.2676**

**z = 50-45/8=0.625**

**P(z>0.625) = 1-P(z<0.625) = 1-0.734 = 0.2676**

2. The current age (in years) of 400 clerical employees at an insurance claims processing centre is

normally distributed with mean = 38 and Standard deviation =6. For each statement below,

please specify True/False. If false, briefly explain why.

A. More employees at the processing centre are older than 44 than between 38 and 44.

**FALSE - As mean = 38, 38+6=44,38-6=32.**

**Around 34% of the data is distributed between 38 and 44 whereas only 16% of the data is distributed after 44.**

B. A training program for employees under the age of 30 at the center would be expected to attract about 36 employees.

**True**

**z=30-38/6=-1.33**

**P(z<-1.33) = 0.0918**

**Total number of employees = 400 \* 0.918 = 36.72 ~ 36 Employees**

1. If X1 ~ N(μ, σ2) and X2 ~ N(μ, σ2) are iid normal random variables, then what is the difference between 2 X1 and X1 + X2? Discuss both their distributions and parameters.

**1. When you add correlated distributions (2X1) their standard deviations add up.**

**2. When you add fully independent distributions (X1+X2) their variances add up.**

1. Let X ~ N(100, 202). Find two values, a and b, symmetric about the mean, such that the probability of the random variable taking a value between them is 0.99.

**The Probability of going wrong, or the Probability outside the a and b area is 0.01 (ie. 1-0.99).  
The Probability towards left from a = -0.005 (ie. 0.01/2).   
The Probability towards right from b = +0.005 (ie. 0.01/2)**

**Z(-0.005)\*20+100 = -(-2.57)\*20+100 = 151.4  
 Z(+0.005)\*20+100 = (-2.57)\*20+100 = 48.**

**D. 48.5, 151.5**