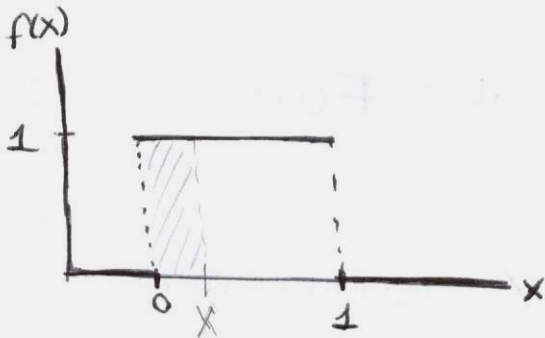


QUIZ 7 -

Question 1:

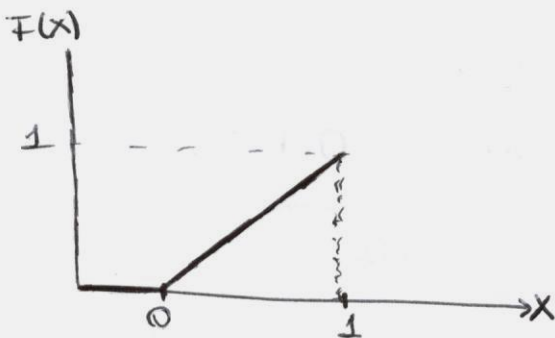
$$f(x) = \begin{cases} 1 & \text{for } 0 \leq x \leq 1 \\ 0 & \text{for all other values of } x \end{cases}$$

a) The probability density function



b) The cumulative distribution function

$$F(x) = \int_0^x f(x) dx = x \Big|_0^x = x.$$



c) The probability that the best choice of the weight X is less than 0.25

$$\int_0^{0.25} f(x) dx = x \Big|_0^{0.25} = \underline{\underline{0.25}}$$

$$\text{OR } F(0.25) = 0.25 \\ = P(X < 0.25) = F(0.25)$$

d) The probability that the best choice of the weight X is more than 0.75

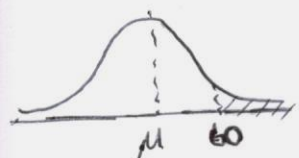
$$\int_{0.75}^1 f(x) dx = x \Big|_{0.75}^1 = 0.25 \quad \text{OR} \quad P(X > 0.75) = 1 - P(X < 0.75) = 1 - F(0.75)$$

e) The probability that the best choice of the weight X is between 0.2 and 0.8

$$\int_{0.2}^{0.8} f(x) dx = x \Big|_{0.2}^{0.8} = 0.6 \quad \text{OR} \quad F(0.8) - F(0.2)$$

Question 2: The random variable X follows a normal distribution with $\mu = 50$ and $\sigma^2 = 64$.

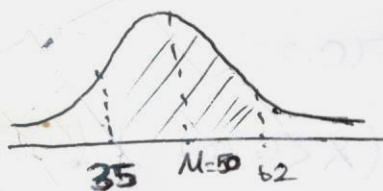
a) The probability that $X > 60$



$$\begin{aligned} P(X > 60) &= 1 - P(X < 60) \\ &= 1 - P\left(\frac{X - 50}{8} < \frac{10}{8}\right) \\ &= 1 - P(Z < 1.25) \\ &= 1 - 0.8944 = 0.1056 \end{aligned}$$

b) $P(35 < X < 62) = ?$

$$\begin{aligned} P\left(\frac{35 - 50}{8} < Z < \frac{62 - 50}{8}\right) &= P\left(-\frac{15}{8} < Z < \frac{12}{8}\right) \\ &= P\left(Z < \frac{12}{8}\right) - \left(1 - P\left(Z < \frac{15}{8}\right)\right) \\ &= 0.9332 - (1 - 0.9693) = 0.9025 \end{aligned}$$

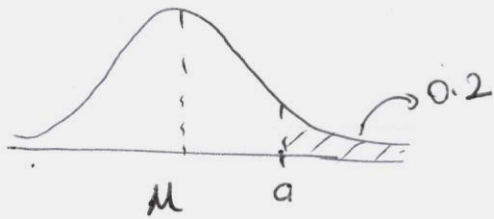


QUIZ 7

Question 2

c) $P(X < 55) \Rightarrow P\left(Z < \frac{55-50}{8}\right) = P\left(Z < \frac{5}{8}\right) \rightarrow 0.62$
 $= 0.7324$

d) $P(X > a) = 0.2 \Rightarrow a = ?$



$$P\left(Z > \frac{a-50}{8}\right) = 0.2$$

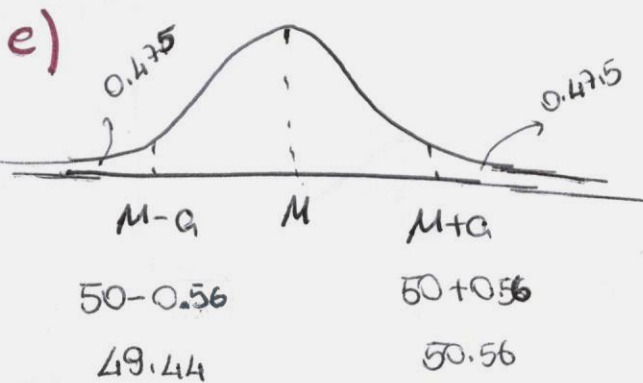
$$1 - P\left(Z < \frac{a-50}{8}\right) = 0.2$$

$$\underbrace{\hspace{10em}}_{0.8}$$

$$Z = 0.84 \Rightarrow F(Z) \approx 0.80$$

$$\frac{a-50}{8} = 0.84$$

$$\boxed{a = 56.72}$$



$$P(\mu - a < X < \mu + a) = 0.05$$

Subtract μ and divide by σ

$$P\left(-\frac{a}{8} < Z < \frac{a}{8}\right) = 0.05$$

$$1 - 0.05 = 0.95, \quad 0.95/2 = 0.475.$$

$$P\left(Z < \frac{a}{8}\right) = 1 - 0.475$$

$$P\left(Z < \frac{a}{8}\right) = 0.525$$

$$\frac{a}{8} = 0.06 \text{ veya } \underline{0.07}$$

$$a = 0.48 \text{ veya } \underline{0.56}$$

$$P(49.44 < X < 50.56) = 0.05$$

↳ Soruda interval sorulmuş.
 (Ladilik)

Not: 2 değer olarak 0.07 seçilmelidir.