# Exam 2 Solutions



1) a) $Y$ is binomial with $n=250$, $p=.08$

$$\mu_Y = np = 250(.08) = \boxed{20}$$

$$\sigma_Y = \sqrt{np(1-p)} = \sqrt{250(.08)(.92)}$$
$$= \boxed{4.29}$$

b) Now, with $n=10$, $p=.08$

$$P(Y=0) = {}_{10}C_0(.08)^0(.92)^{10}$$

$$= 1\cdot(.92)^{10} = \boxed{.434}$$

c) $P(Y\geq 2) = 1 - P(Y\leq 1)$

$$= 1-\left({}_{10}C_0(.08)^0(.92)^{10} + {}_{10}C_1(.08)^1(.92)^9\right)$$

$$= 1-(.434 + .378)$$
$$= \boxed{.188}$$

2) $\sum P(x) = 1$, so $P(3) = 1 - \frac{1}{2} - \frac{1}{4} - \frac{1}{8}$

$$= \frac{1}{8}$$

$$E(X) = \sum x P(x)$$

$$= 1 \cdot \frac{1}{2} + 2 \cdot \frac{1}{4} + 3 \cdot \frac{1}{8} + 4 \cdot \frac{1}{8}$$

$$= \boxed{\frac{15}{8}}$$

3) $P(275 \le X \le 300)$

$$z_1 = \frac{275 - 280}{40} = -.125$$

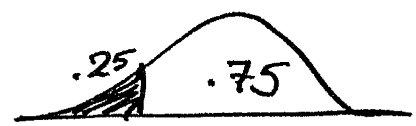
$$z_2 = \frac{300 - 280}{40} = .5$$

$$P(z_1 \le Z \le z_2) = P(Z \le z_2) - P(Z \le z_1)$$

$$= .6915 - .4503$$

$$= \boxed{.2412}$$

4) We want $z_{.75} = -.6745$




$$-.6745 = \frac{x-80}{6}$$

$$x = 80 - 6(.6745)$$

$$= \boxed{75.95} \text{ lbs.}$$

5) For the sample mean, it is normally distributed with $\mu_{\bar{x}} = 81.7$ and $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = 6.9/\sqrt{8} = 2.440$

For 75, $z = \frac{75-81.7}{2.440} = -2.745$

$$P(\bar{x} \leq 75) = P(Z \leq -2.745) = \boxed{.003}$$

6) We want to construct a 90% Z-interval because we know $\sigma$.

$$Z_{\alpha/2} = Z_{.05} = 1.645$$

$$\bar{X} \pm Z_{\alpha/2}\frac{\sigma}{\sqrt{n}} = 1.21 \pm (1.645)\frac{.65}{\sqrt{1120}}$$

$$= \boxed{1.178 \text{ to } 1.242}$$

7) We don't know $\sigma$, so we make a t-interval. To do so, we have to <u>assume</u> the population is normally distributed because $n < 30$.

With 13 d.o.f. $t_{.005} = 3.01\cancel{8}2$

$$\bar{X} \pm t_{\alpha/2}\frac{s}{\sqrt{n}} = 13.36 \pm (3.012)\frac{.22}{\sqrt{14}}$$

$$= \boxed{13.18 \text{ to } 13.54}$$