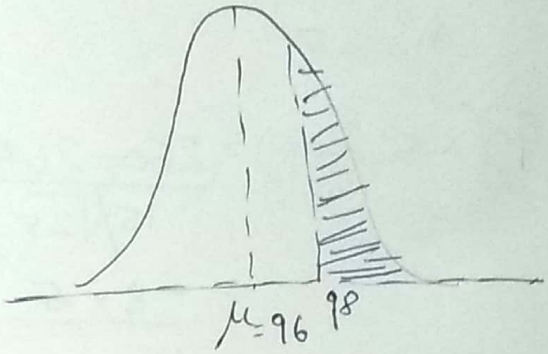
Central Limit Theorem

1 ≡

$\mu_{pop} = 96$

$\sigma_{pop} = 16$

$n = 35$



$$Z_{score} = \frac{98-96}{16/\sqrt{35}}$$

$$= \frac{2\sqrt{35}}{16} \simeq .74$$

$$= .7704$$

$P(>98) = 1 - Z_{score}$

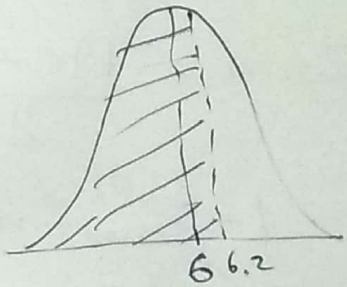
$= 1 - .7704$

$= .2296$

$\simeq 22.9$ or 23%

2 ≡

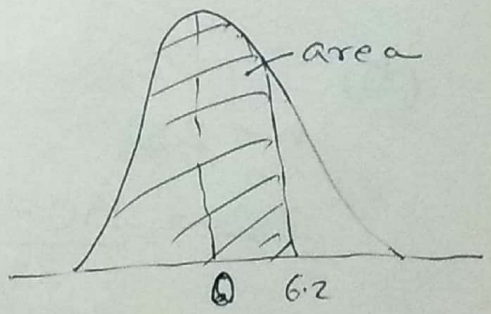
$\mu = 6 \quad , \quad \sigma = 1$



(a) $\frac{6.2-6}{1} = .2$

$Z_{score}(.2) = .5793$

$\simeq 57.9\%$



(b) $n = 100$

$$Z_{score} = \frac{6.2-6}{1/\sqrt{100}} = \frac{.2 \times 10}{}$$

$= 2$

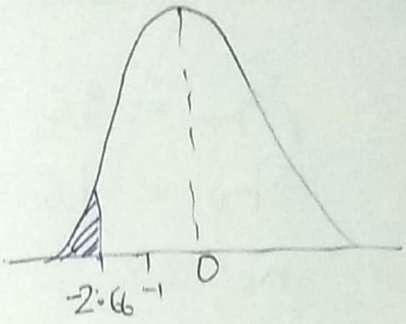
$= .9772$

$\simeq 97.7\%$

3

$\mu = 268$, $\sigma = 15$

$n = 25$

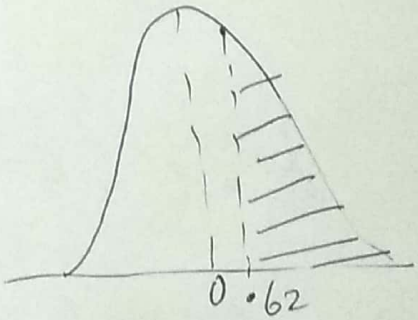


$$P(x < 260) = \frac{260 - 268}{15/\sqrt{25}}$$

$$= \frac{-8 \times 5}{15_3} = -2.66$$

$$= .0039 \simeq \boxed{.39\%}$$

(4) $\mu = 172 \quad \sigma = 29$



(a) $Z\text{score} = \frac{190 - 172}{29} = .62$

$1 - Z_{score}(.62)$

$1 - .7324 = .2676$

$\simeq \boxed{26.7\%}$

(b)

$n = 25$

$Z_{score} = \frac{190 - 172}{29/\sqrt{25}} = \frac{18 \times 5}{29}$

$= 3.10$

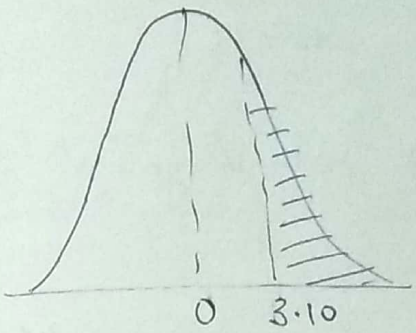
$1 - Z_{score}(3.10)$

$1 - .9990 = .001$

$\simeq \boxed{.1\%}$

(c) Max = 4750

n = 25



Mean weight = 25 × 172 = 4300

σ = 25 × 29 = 725

$$\frac{4750 - 4300}{725/\sqrt{25}} = \frac{450 \times 5}{725}$$

$$= 3.10$$

$$1 - Z_{score}(3.10) = 1 - .9990$$

$$= .001$$

$$\simeq .1\%$$

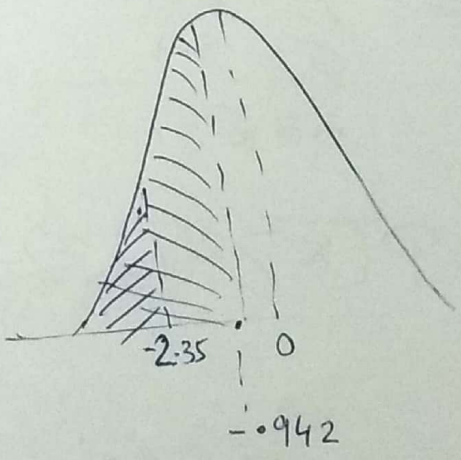
5

$\mu = 4 \quad \sigma = 1.5$

$n = 50$

$$Z_{score\ 3.5} = \frac{3.5 - 4}{1.5/\sqrt{50}} = \frac{-.5 \times 7.071}{1.5} = -2.35$$

$$Z_{score}(3.8) = \frac{3.8 - 4}{1.5/\sqrt{50}} = \frac{-.2 \times 7.071}{1.5} = -.9428$$



$$Z_{sco}(-.942) - Z_{score}(-2.35)$$

$$= .1736 - .0094$$

$$= 0.1642 \quad \simeq 16.42\%$$

6 $n = 64$
$\mu = 50$
$\sigma = 16$

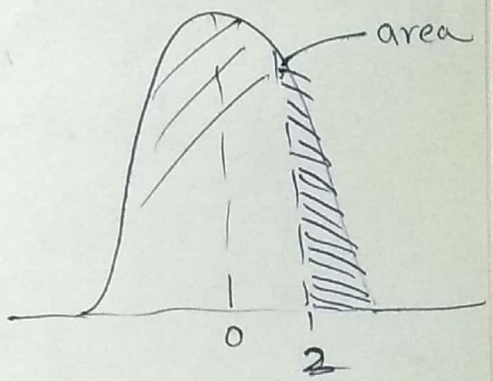
(a) With Large "n" $\Rightarrow$ μ or Expectatancy SDM $\simeq \mu_{pop}$

$$\boxed{\mu_{SOSM} = 50}$$

$$\sigma_{SOSM} = \frac{16}{\sqrt{64}} = \frac{16}{8} = \boxed{2}$$

(b) $P(X > 54) =$

$$Z_{score} = \frac{54 - 50}{16/\sqrt{64}} = \frac{4 \times 8}{16} = 2$$



$$1 - Z_{score}(2) = 1 - .9772$$
$$= .0228 \simeq \boxed{2.28\%}$$

(C) it's a normal distribution.
Area shaded will be considerd.

7 $\mu = 23.1$
$\sigma = 3.1$
$n = 6$

$$P(X > 27) \Rightarrow \frac{27 - 23.1}{3.1/\sqrt{6}} = 1.25 \times \sqrt{6}$$
$$= 3.06$$

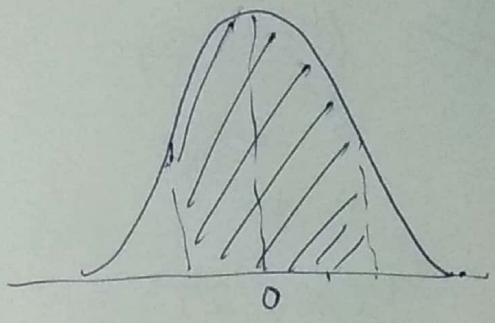
$$1 - Z_{score}(3.06)$$
$$1 - .9989 \simeq \boxed{0.11\%}$$

8

$\mu = 21.50$

$\sigma = 2.22$

$n = 8$ checks



$P(20 < x < 23) =$

$$Z_{score}(23) = \frac{23 - 21.50}{2.22/\sqrt{8}} = \frac{1.50}{.7848} = 1.911 = .9719$$

$$z\,score\,(20) = \frac{20 - 21.50}{2.22/\sqrt{8}} = \frac{-1.50}{.7848} = -1.911 = .0281$$

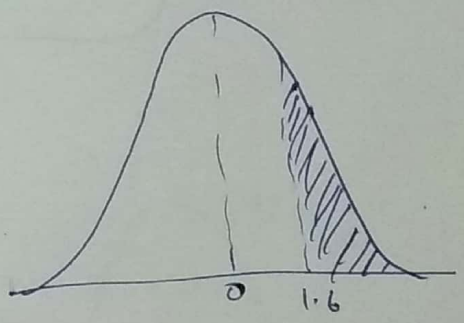
$.9719 - .0281 = .9438$

$\simeq 94.3\%$

9

$\mu = 75$

$\sigma = 5$



(a) $P(X \geq 83) =$

$$Z_{score} = \frac{83 - 75}{5} = 1.6$$

$1 - Z_{score}(1.6) = 1 - .9452 = .0548$ $\simeq 5.48\%$

(b) $n = 5$

$$Z_{score} = \frac{83 - 75}{5/\sqrt{5}} = \frac{8 \times \sqrt{5}}{5} = 3.577$$

$1 - Z_{score}(3.577) = 1 - .9998$

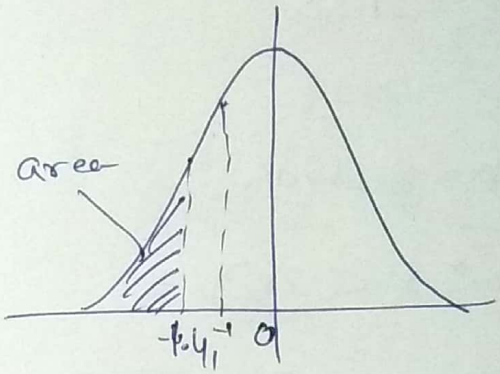
$= .0002$

$\simeq .02\%$

10 $\mu = 28.3\,yr$

$\sigma = 2.3\,yr$

$n = 10$



$P(X < 27) =$

$$Z_{scr} = \frac{27 - 28.3}{2.3/\sqrt{10}} =$$

$= -.4278 \times \sqrt{10} = -1.426 \simeq -1.43$

$\simeq 7.63\%$

$= -1.786 \simeq -1.79$

$= .0367$

$\simeq 3.67\%$