HW 7.3 PartA pg 441 43-46 (mc) pages 454-455 prob 49, 51, 53, 55

43) $p = .3$ $\hat{p} = .30$ $\boxed{B}$

44) ✓10 %. $10(750) \le$ pop Div I athletes
7500 ≤ pop reasonable to assume

$\boxed{C}$

$\sigma_{\hat{p}} = \sqrt{\frac{(.30)(.70)}{750}} = .0167 \approx .017$

45) $\boxed{B}$ let $n = 750$ now reduce 750 to 375, so $375 = \frac{n}{2}$

so $\sigma_{\hat{p}} = \sqrt{\frac{.30(.70)}{750}} = \sqrt{\frac{.30(.70)}{n}}$ where $n = 750$

so to reduce to 375 $375 = n/2$ $\sqrt{\frac{.30(.70)}{\frac{n}{2}}} = \sqrt{\frac{2(.30)(.70)}{n}}$

$= \sqrt{2} \cdot \sqrt{\frac{(.30)(.70)}{n}}$

46) $np \ge 10$ and $n(1-p) \ge 10$ $\boxed{B}$

$750(.3) \ge 10$ $750(.70) \ge 10$

$225 \ge 10$ and $525 \ge 10$

49) $\mu_x = 225$ sec $\sigma_x = 60$ sec $n = 10$ X = play time of song in seconds

since SRS of $n = 10$, $\mu_{\bar{x}} = \mu_x = 225$ sec

✓10 %

$10(10) \le 10{,}000$ ✓ so $\sigma_{\bar{x}} = \frac{60}{\sqrt{10}} \approx 18.9737$ seconds

These results do not depend of the shape of the distribution of individual play times.

51) want $\sigma_{\bar{x}} = 30$ seconds

$30 = \frac{60}{\sqrt{n}} \rightarrow \sqrt{n} = \frac{60}{30} \rightarrow \sqrt{n} = 2 \rightarrow n = 4$

we need a sample size of 4.

(53) Blood cholesterol follows Normal Distribution
$\mu = 188$ mg/dl $\quad \sigma = 41$ mg/dl

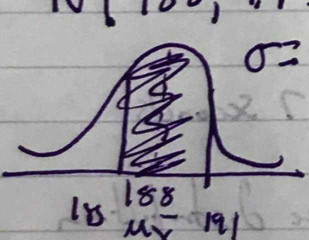
a) Since SRS with $n = 100$ and $\mu_x = 188$,
the $\mu_{\bar{x}} = \mu_x = 188$ mg/dl

✓ 10%
$10(100) \le$ pop of 20 to 34 year old men
$1000 \le$ pop reasonable to assume

$$\sigma_{\bar{x}} = \frac{41}{\sqrt{100}} = \frac{41}{10} = 4.1 \text{ mg/dl}$$

The sampling distribution of $\bar{x}$ is Normal with $\mu_{\bar{x}} = 188$ mg/dl and $\sigma_{\bar{x}} = 4.1$ mg/dl

b) $P(185 \le \bar{x} \le 191)$
$N(188, 4.1)$ $\quad$ normalcdf(185, 191, 188, 4.1)
$\sigma = 4.1$ $\quad \approx .5357$

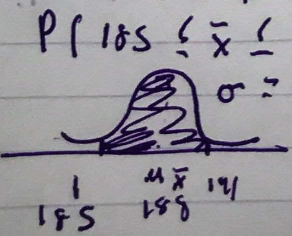


c) let $n = 1000$
✓ 10% $\quad 10(1000) \le$ pop 20 to 34 year old men
$10{,}000 \le$ pop reasonable to assume

The larger sample size is better since it is more likely to produce a sample mean within 3 mg/dl of the population mean

$$\sigma_{\bar{x}} = \frac{41}{\sqrt{1000}} \approx 1.2965 \text{ mg/dl}$$

$N(188, 1.2965)$
$P(185 \le \bar{x} \le 191) \approx$
$\sigma = 1.2965$ $\quad$ normalcdf(185, 191, 188, 1.2965)
$\approx .9793$



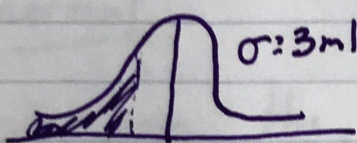
Hw 7.3 Part A

(55) a) Let x = amount of cola in the bottle

$\mu_x = 298$ ml $\sigma_x = 3$ ml Normal Distribution

$P(x < 295 \text{ ml})$

$N(298, 3\text{ml})$



$\sigma = 3$ml

295 298

normcdf($-\infty$, 295, 298, 3) $\approx$ .1587

* (should be close to 16% since 295 is 1σ below mean) *

b) $P(\bar{x} < 295)$

$\mu_{\bar{x}} = \mu_x = 298$

✓10%

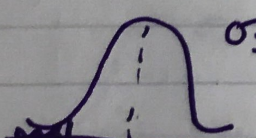
n=6 10(6) ≤ pop all bottles

60 ≤ pop reasonable to assume

so $\sigma_{\bar{x}} = \frac{3}{\sqrt{6}} = 1.2247$

Since X is normal, sampling distribution of $\bar{x}$ will be Normal

$N(298, 1.2247)$



$\sigma = 1.2247$

295 298

normcdf($-\infty$, 295, 298, 1.2247) = .0071

The probability that the mean contents of 6 randomly selected cola bottles is less than 295 ml is .0071.