Final Review Solutions

4.) $\mu = 5850$, $n = 20$ (random sample sizes)

If random samples are drawn from a population with mean μ + standard deviation σ, then the avg sample (mean of each sample) is normally distributed w/ mean $= \mu$ + standard deviation $= \frac{\sigma}{\sqrt{n}}$

Calculate the z-scores to see if any fall outside the range of -2 to 2. If so, that mean x-value used to obtain the z-score would be considered unusual.

$$Z = \frac{X - \mu}{\left(\frac{\sigma}{\sqrt{n}}\right)} = \frac{5180 - 5850}{\left(\frac{1125}{\sqrt{20}}\right)} = \boxed{-2.66}$$, thus

\$5180 [C] is considered unusual.

$1 - \text{binomcdf}(n, p, x) \rightarrow P(X > x)$
$\text{binomcdf}(n, p, x) \rightarrow P(X \leq x)$

31.)
- n = # of trials = 150
- p = probability of success on a single trial = 0.85
- q = " " failure " " " " $= 1 - p = 1 - .85 = .15$
- x = # of successes in n trials

* Calculator: $\text{binompdf}(n, p, x) \Rightarrow P(X = x)$

The probability of exactly x successes in n trials is: $P(x) = {}_nC_x\,(p^x)(q^{n-x})$

- If we are looking for the probability that not enough seats are avail., then we need to find $P(X > 140) = P(141) + P(142) + \ldots + P(150)$

- The long way $\Rightarrow {}_{150}C_{141}\,(.85)^{141}(.15^9) + {}_{150}C_{142}(.85)^{142}(.15)^8 + \ldots +$

- Short cut $\Rightarrow \text{binomcdf}(150, .85, 150) - \text{binomcdf}(150, .85, 140)$
$= 5.3907\,E^{-4} \approx \boxed{.0005}$

32.) Geometric mean $= \frac{1}{p}$, where $p =$ probability of success in one trial

Since we are using the geometric mean to find the # of defective parts, + we are given the probability of defective parts, then $p = .10$ (since the part being defective is considered a success in this case)

- Geometric mean $= \frac{1}{0.1} = 10$, so on avg, 10 items will be examined before finding a computer component that is defective.

33.) When $n \cdot p$ and $n \cdot q$ are greater than 5, you can use normal approximation to solve a binomial distribution problem.

$n = \underline{16}$, $p = \underline{.9}$, $q = 1 - p = 1 - .9 = \underline{.1}$

$n \cdot p = 16 \cdot 0.9 = 14.4 > 5$ ✓

$n \cdot q = 16 \cdot 0.1 = 1.6 < 5$

* Since $n \cdot q = 1.6 < 5$, you cannot use a normal distribution to solve this binomial distribution

34.) Find z-scores for 64 in + 78 in, then find their probabilities. Multiply $500 \cdot [1 - (\text{higher prob.} - \text{lower prob.})]$

$z = \frac{64-69}{2.8} = \underline{-1.7857}$, $z = \frac{78-69}{2.8} = \underline{3.214}$

$500\left[1 - \text{normalcdf}(-1.7857, 3.214)\right] = 18.86 \approx \boxed{19 \text{ men}}$

Final Review Solutions (continued)

35.) When using the normal distribution to approximate the binomial distribution, use the following formulas to calculate the mean + the standard deviation ($\mu = np$, $\sigma = \sqrt{npq}$), then use those values to find the z-score. Finally, use the z-score to compute the probability.

* make sure you rewrite the probability statement using the probability correction factor [subtract 0.5 if finding $P(X \geq x)$ and add 0.5 if finding $P(X < x)$]

$P(X \geq 70) \rightarrow P(X \geq 70 - 0.5) \rightarrow P(X \geq 69.5)$

$P(X \geq 69.5) =$ normalcdf(z-score, 10000)

where $n = 100$, $p = 0.6$, $X = 69.5$, $\mu = np$, $\sigma = \sqrt{npq}$

$\mu = 100 \cdot 0.6 = \underline{60}$

$\sigma = \sqrt{100(0.6)(0.4)} \approx 4.9$

$z = \frac{x - \mu}{\sigma} = \frac{69.5 - 60}{4.9} = \underline{1.94}$

$P(x \geq 69.5) =$ normalcdf$(1.94, 10000) = \boxed{0.0262}$

36.) 85 has two digits, so start from the beginning (far left) and begin choosing pairs of #'s in order from (L) to (R). Any pair > 85, skip and select the next pair (can't repeat pairs)

16, 34, 69, 38, 13

37.) 200 has 3 digits, so start from the far left and begin choosing numbers in groups of 3 (that are less than 200)

163, 169, 15, 92, 97

39.) When constructing an Ogive (cumulative frequency graph) start w/ the lowest class boundary & then write only upper class boundaries to the right of the lower class boundary (on the x-axis). The y-axis will be the cumulative frequency.
Be sure to make a class, class boundaries, frequency, & cumulative frequency column when creating the frequency distribution.
* the first dot that is plotted should always be at the lowest class boundary (directly on the x-axis)
[See answer sheet for frequency distribution table and ogive]

40.) $1 - \left[\frac{20}{19+20+40+42}\right] \approx \underline{0.835}$

These #'s are estimates based off of the graph

41.) $\frac{(42+19)}{(42+40+20+19)} \approx \underline{0.504}$

43.) * This problem is a lot like # 4

$\mu = 32{,}000$, standard deviation $= \frac{\sigma}{\sqrt{n}} = \frac{3000}{\sqrt{100}} = \underline{300}$

$z = \frac{32{,}500 - 32{,}000}{300} = \underline{1.667}$

normalcdf $(-10\,000, 1.667) = \boxed{0.952}$

45.) put in List in your calculator, then use
1 var stat $\rightarrow$ $\bar{X}$ = mean
Med = median

46.)

48.) $np = 5$, $nq = 20$. Since both are ≥ 5, then yes, it is appropriate to use a normal distribution

61.) $$z = \frac{X - \mu}{\left(\frac{\sigma}{\sqrt{n}}\right)} = \frac{98.4 - 98.6}{\left(\frac{0.6}{\sqrt{36}}\right)} = -2$$

normalcdf(−2, 10000) = $\boxed{0.9772 \rightarrow A}$

66.) $P(x < 2) = P(x \leq 2) - P(x = 2)$
poissoncdf(.55, 2) − poissonpdf(.55, 2)
= $\boxed{0.894}$