I. USE THE NORMAL TABLE.

4. GIVEN $\mu = 63$, $\sigma = 5.4$, FIND $P(x > 55) =$
5. GIVEN $\mu = 485$, $\sigma = 31.1$, FIND $P(x < 400) =$
6. GIVEN $\mu = 46$, $\sigma = 4.1$, FIND $P(33 < x < 63) =$
7. GIVEN $\mu = 660$, $\sigma = 57.1$, $n = 40$ FIND $P(645 < \overline{x} < 670) =$
8. GIVEN A NORMALLY DISTRIBUTED POPULATION WITH $\mu = 77.7$, $\sigma = 8.8$, $n = 12$ FIND $P(75 < \overline{x} < 80) =$
9. GIVEN A NORMALLY DISTRIBUTED POPULATION WITH $\mu = 146.3$, $\sigma = 46.2$, $n = 53$ FIND $P(133.1 < \overline{x} < 137.2) =$

II. IF 35% OF A GROUP OF MARTIANS ARE KARGS, AND A SAMPLE OF 220 MARTIANS ARE RANDOMLY SELECTED, FIND THE PROBABILITY THAT THE PROPORTION WHICH ARE KARGS WILL BE

10. MORE THAN .282:
11. FEWER THAN .427:
12. BETWEEN .382 AND .418:

III. SUPPOSE THAT THE LENGTHS OF ANTANAE ON KARGS (FROM THE PLANET MARS) ARE NORMALLY DISTRIBUTED WITH MEAN OF 56.8cm AND STANDARD DEVIATION OF 3.2cm. FIND THE PROBABILITY THAT A RANDOMLY SELECTED KARG WILL HAVE ANTANAE WHICH ARE:

13. SHORTER THAN 50cm.
14. LONGER THAN 48.3cm.
15. BETWEEN 51cm AND 62cm.
16. EXACTLY 58cm.
17. WHAT VALUE DETERMINES THE 98TH PERCENTILE?

IIII. ASSUME THAT THE WEIGHTS OF KARGS HAS A MEAN OF 552.2kg AND STANDARD DEVIATION OF 32.1kg. IF A RANDOM SAMPLE OF 110 KARGS IS SELECTED, WHAT IS THE PROBABILITY THAT THE SAMPLE WILL HAVE A MEAN WEIGHT THAT IS:

18. BELOW 560 ?
19. BETWEEN 543 AND 547 ?
20. ABOVE 545 ?
21. BETWEEN 550 AND 560 ?
22. ABOVE 565 ?

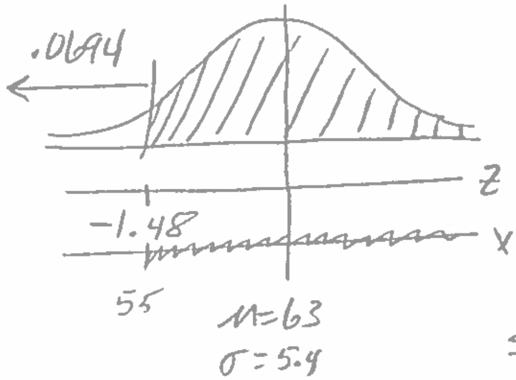
VI. SUPPOSE THAT 64% OF KARGS HAVE BEEN TO THE VIKING SPACECRAFT LANDING SITE. FIND THE PROBABILITY THAT OUT OF A RANDOM SAMPLE OF 55 KARGS, THE PROPORTION OF KARGS WHICH HAVE BEEN TO THE VIKING LANDING SITE WILL BE:

23. LESS THAN .51:
24. GREATER THAN .472:
25. BETWEEN .727 AND .777:

I

SOLUTIONS NORMAL CURVE PRACTICE

4. $\mu = 63$
$\sigma = 5.4$
$P(X > 55)$

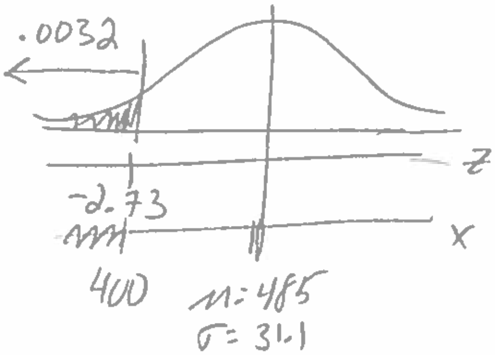


$$z = \frac{x-\mu}{\sigma} = \frac{55-63}{5.4} = -1.48 \longrightarrow .0694$$

TABLE VALUE

$$\text{so: } P(X > 55) = 1 - .0694 = \boxed{.9306}$$

5. $\mu = 485$
$\sigma = 31.1$
$P(X < 400)$

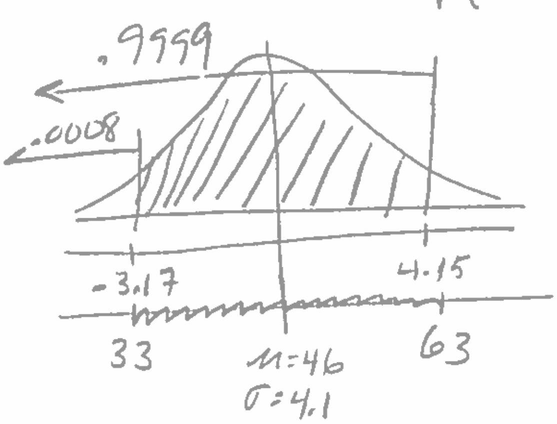


$$z = \frac{x-\mu}{\sigma} = \frac{400-485}{31.1} = -2.73 \Longrightarrow .0032$$

TABLE VALUE

so
$$P(X < 400) = \boxed{.0032}$$

6. $\mu = 46$
$\sigma = 4.1$
$P(33 < X < 63)$



$$z_1 = \frac{x-\mu}{\sigma} = \frac{33-46}{4.1} = -3.17 \longrightarrow .0008$$

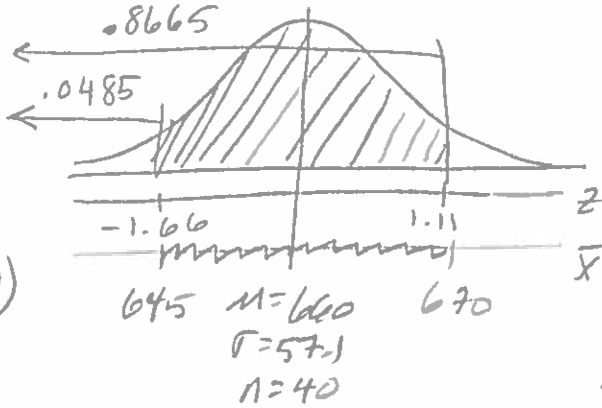
TABLE VALUES

$$z_2 = \frac{63-46}{4.1} = 4.15 \longrightarrow .9999$$

NOTE!

$$\text{so } P(33 < X < 63) = .9999 - .0008 = \boxed{.9991}$$

7. $\mu = 660$
$\sigma = 57.1$
$n = 40$
$P(645 < \bar{X} < 670)$



$z_1 = \dfrac{\bar{x}-\mu}{\sigma/\sqrt{n}}$

$= \dfrac{645-660}{57.1/\sqrt{40}}$ TABLE VALUES

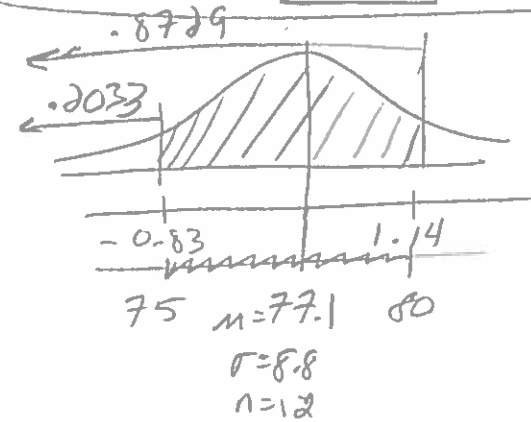
$= -1.66 \Longrightarrow .0485$

$z_2 = \dfrac{670-660}{57.1/\sqrt{40}}$

$= 1.11 \Longrightarrow .8665$

SO $P(645 < \bar{X} < 670) =$
$= .8665 - .0485$
$= \boxed{.8180}$

8. $\mu = 77.1$
$\sigma = 8.8$
$n = 12$
Normally Distributed
$P(75 < \bar{X} < 80)$



$z_1 = \dfrac{\bar{x}-\mu}{\sigma/\sqrt{n}}$

$= \dfrac{75-77.1}{8.8/\sqrt{12}}$ TABLE VALUES

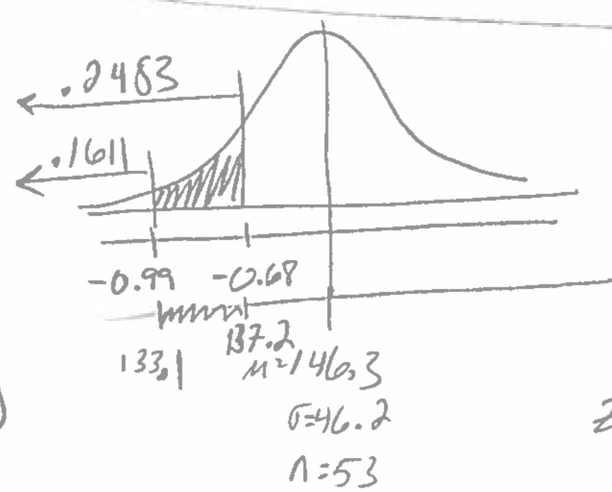
$= -0.83 \Rightarrow .2033$

$z_2 = \dfrac{80-77.1}{8.8/\sqrt{12}}$

$= 1.14 \Rightarrow .8729$

SO $P(75 < \bar{x} < 80) = .8729 - .2033$
$= \boxed{.6696}$

9. $\mu = 146.3$
$\sigma = 46.2$
$n = 53$
Normally Distributed
$P(133.1 < \bar{X} < 137.2)$



$z_1 = \dfrac{\bar{x}-\mu}{\sigma/\sqrt{n}}$

$= \dfrac{133.1-146.3}{46.2/\sqrt{12}}$ TABLE VALUE

$= -0.99 \Longrightarrow .1611$

$z_2 = \dfrac{137.2-146.3}{46.2/\sqrt{12}}$

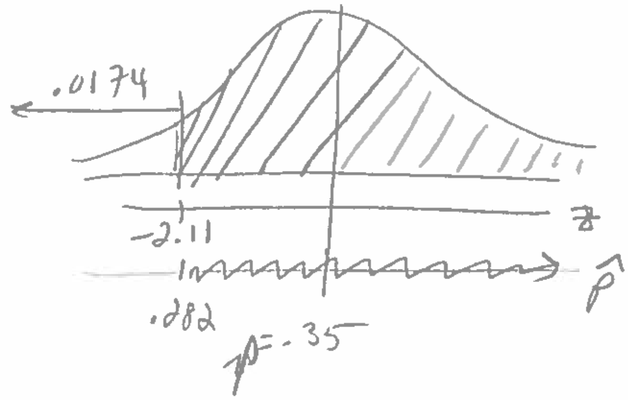
$= -0.68 \Longrightarrow .2483$

SO $P(133.1 < \bar{x} < 137.2) =$
$= .2483 - .1611 = \boxed{.0872}$

II. $p = .35$

$n = 220$

(10) $P(\hat{p} > .282)$



$$z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}} \qquad q = 1-p = 1-.35 = .65$$

$$= \frac{.282 - .35}{\sqrt{\frac{(.35)(.65)}{220}}}$$

$= -2.11$ TABLE VALUE $\rightarrow .0174$

So $P(\hat{p} > .282) = 1 - .0174$

$= \boxed{.9826}$

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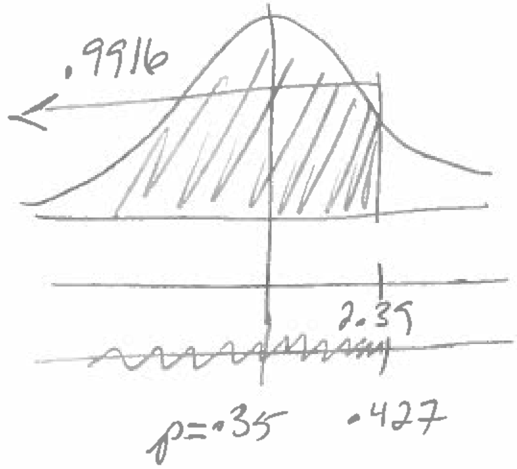
(11) $P(\hat{p} < .427)$



$$z = \frac{\hat{p} - p}{\sqrt{\frac{p \cdot q}{n}}} \qquad q = 1-p$$

$$= \frac{.427 - .35}{\sqrt{\frac{(.35)(.65)}{220}}}$$

$= 2.39 \xrightarrow{\text{TABLE VALUE}} .9916$

So $P(\hat{p} < .427) = \boxed{.9916}$

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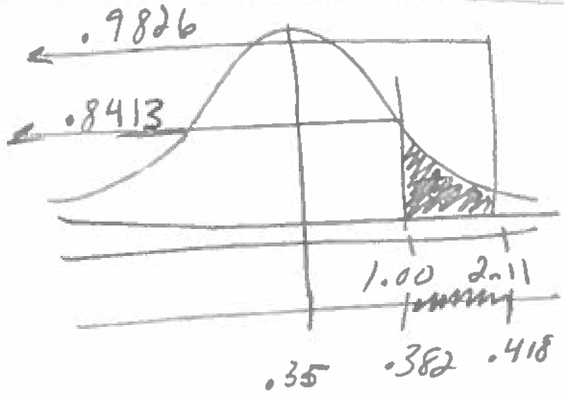
(12) $P(.382 < \hat{p} < .418)$



$$z_1 = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}} \qquad q = 1-p$$

$$= \frac{(.382) - .35}{\sqrt{\frac{(.35)(.65)}{220}}} = 0.995$$

$\Rightarrow$ use 1.00

$$z_2 = \frac{.418 - .35}{\sqrt{\frac{(.35)(.65)}{220}}}$$

$= 2.11$

$z_1 = 1.00 \Rightarrow .8413$

$z_2 = 2.11 \Rightarrow .9826$

TABLE VALUES

So

$P(.382 < \hat{p} < .418) =$

$= .9826 - .8413$

$= \boxed{.1413}$

III. $\mu = 56.8$

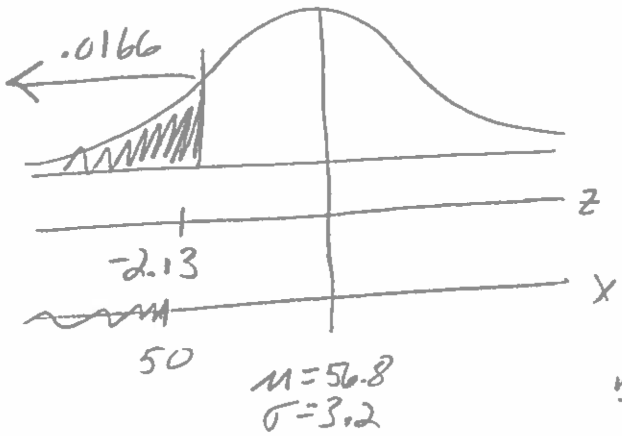
$\sigma = 3.2$

one data value

Normally distributed

NOTE!

(13) $P(X < 50)$



$z = \frac{x - \mu}{\sigma}$

$= \frac{50 - 56.8}{3.2}$

$= -2.125$

use $= -2.13$ TABLE VALUE $\rightarrow .0166$

so $P(X<50) = \boxed{.0166}$

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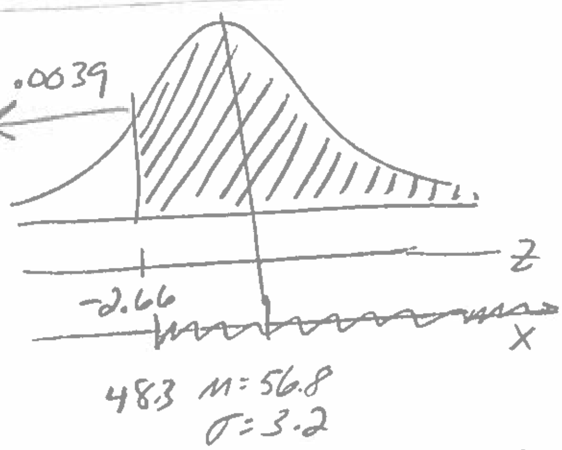
(14) $P(X > 48.3)$



$z = \frac{x - \mu}{\sigma}$

$= \frac{48.3 - 56.8}{3.2}$

$= -2.66 \Rightarrow .0039$ TABLE VALUE

so $P(X > 48.3) = 1 - .0039$

$= \boxed{.9961}$

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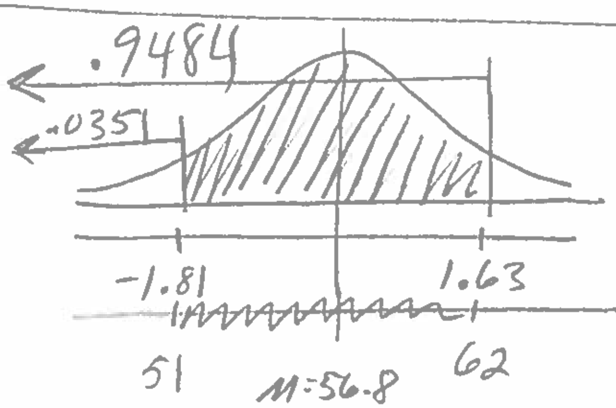
(15) $P(51 < x < 62)$



$z_1 = \frac{x - \mu}{\sigma}$

$= \frac{51 - 56.8}{3.2}$

$= -1.81 \rightarrow .0351$ TABLE VALUES

$z_2 = \frac{62 - 56.8}{3.2}$

$= 1.63 \Rightarrow .9484$

so $P(51<x<62) = .9484 - .0351$

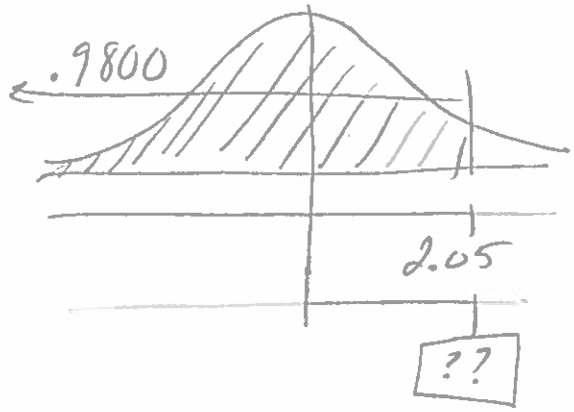
$= \boxed{.9133}$

(16) $P(X=58) = \boxed{0}$ DONE

(17) 98th %-ile.

with $\mu = 56.8$

$\sigma = 3.2$



.9800

.9798 .9803

CLOSER

$z = 2.05$

so $z = \frac{x-\mu}{\sigma}$

$\Rightarrow 2.05 = \frac{x - 56.8}{3.2}$

$\Rightarrow x - 56.8 = (3.2)(2.05)$

$= 6.56$

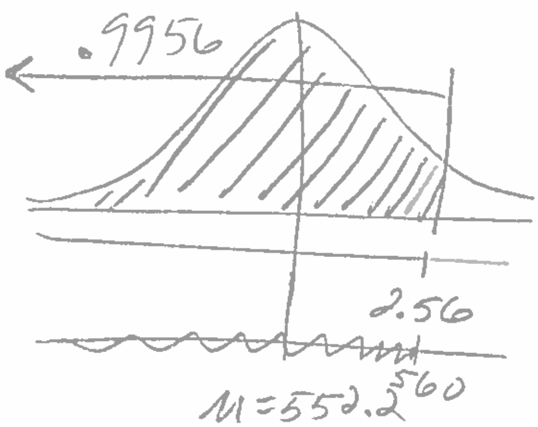
$\Rightarrow x = \boxed{63.36}$

(III) $\mu = 552.2$

$\sigma = 32$

$n = 110$

(18) $P(\bar{X} < 560)$



$z = \frac{\bar{x} - \mu}{\sigma / \sqrt{n}}$

$= \frac{560 - 552.2}{32/\sqrt{110}}$

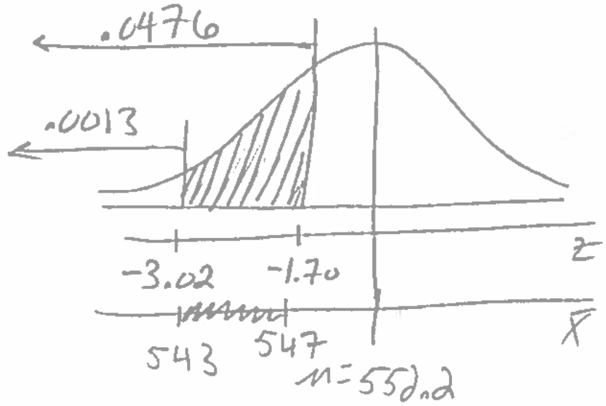
$= 2.56$

TABLE VALUE

.9948

so $P(X < 560) = \boxed{.9948}$

(19). $P(543 < \bar{x} < 547)$



$\mu = 552.2$
$\sigma = 32$
$n = 110$

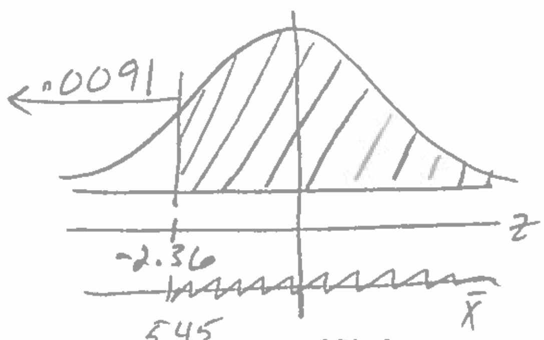
$$z_1 = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} = \frac{543 - 552.2}{32/\sqrt{110}} = -3.02 \longrightarrow .0013$$

$$z_2 = \frac{547 - 552.2}{32/\sqrt{110}} = -1.70 \longrightarrow .0446$$

TABLE VALUES

so $P(543 < \bar{x} < 547) = .0446 - .0013 = \boxed{.0433}$

(20). $P(\bar{x} > 545)$



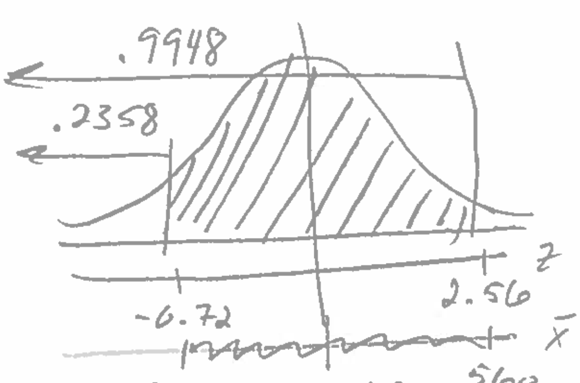
$\mu = 552.2$
$\sigma = 32$
$n = 110$

$$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} = \frac{545 - 552.2}{32/\sqrt{110}} = -2.36 \longrightarrow .0091$$

TABLE VALUES

so $P(\bar{x} > 545) = 1 - .0091 = \boxed{.9909}$

(21) $P(550 < \bar{x} < 560)$



$\mu = 552.2$
$\sigma = 32$

$$z_1 = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} = \frac{550 - 552.2}{32/\sqrt{110}} = -0.72 \longrightarrow .2358$$

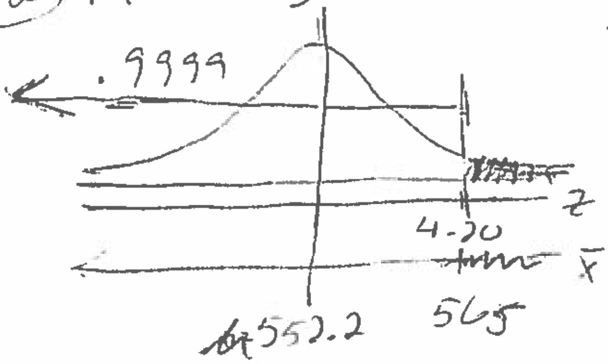
$$z_2 = \frac{560 - 552.2}{32/\sqrt{110}} = 2.56 \longrightarrow .9948$$

TABLE VALUES

so $P(550 < \bar{x} < 560)$:
$= .9948 - .2358$
$= \boxed{.7590}$

pg $\xrightarrow{\text{even}}$

(22) $P(\bar{X} > 565)$



$\mu = 552.2$
$\sigma = 30$
$n = 110$

$$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$$

$$= \frac{565 - 552.2}{30/\sqrt{110}}$$

$$= 4.20 \longrightarrow .9999$$

TABLE VALUE

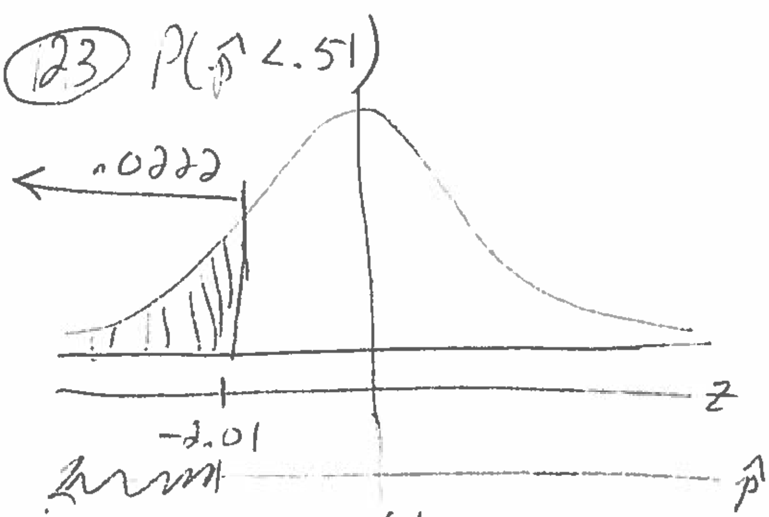
Because it is beyond our table

So

$$P(\bar{X} > 565) = 1 - .9999$$
$$= \boxed{.0001}$$

(VI) $p = .64 \Rightarrow q = 1 - p$
$n = 55$ $\quad q = 1 - .64$
$\quad = .36$

(23) $P(\hat{p} < .51)$



$$z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}}$$

$$= \frac{.51 - .64}{\sqrt{\frac{(.64)(.36)}{55}}}$$

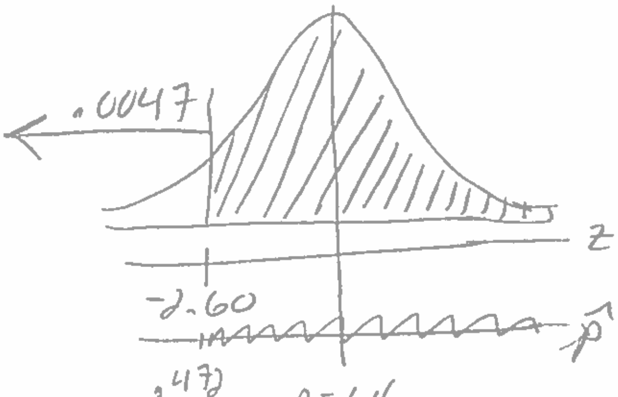
$$= -2.01 \longrightarrow .0222$$

TABLE VALUE

So

$$P(\hat{p} < .51) = \boxed{.0222}$$

24. $P(\hat{p} > .472)$



$$z = \frac{\hat{p} - p}{\sqrt{\frac{p \cdot q}{n}}}$$

$$= \frac{.472 - .64}{\sqrt{\frac{(.64)(.36)}{55}}}$$

TABLE VALUE

$$= -2.60 \longrightarrow .0047$$

so $P(\hat{p} > .472) = 1 - .0047$

$= \boxed{.9953}$

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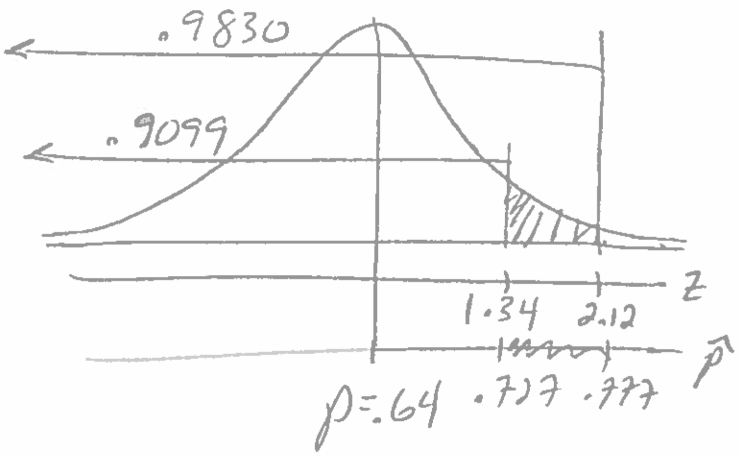
25. $P(.727 < \hat{p} < .777)$



$$z_1 = \frac{\hat{p} - p}{\sqrt{\frac{p \cdot q}{n}}}$$

$$= \frac{.727 - .64}{\sqrt{\frac{(.64)(.36)}{55}}}$$

TABLE VALUES

$$= 1.34 \longrightarrow .9099$$

$$z_2 = \frac{.777 - .64}{\sqrt{\frac{(.64)(.36)}{55}}} \longrightarrow .9830$$

$$= 2.12$$

so $P(.727 < \hat{p} < .777) =$

$= .9830 - .9099$

$= \boxed{.0731}$