Stat 1030 Exam 2 Prep Worksheet

W E L C O M E B A C K !

Stat 1030 Exam 2 Prep Worksheet

(Prof. Whitten leads discussion of Problem A as an ICE-BREAKER after Spring Break.)

- **Take complete notes!**
- **Allow your mind to re-acclimate to Stats.**
- **Have your calculator ready to calculate!**

Problem A

1. x = number of coupons redeemed/semester

2. Binomial

3. y = money Yang earns per semester

4.

$$y = 2.5\ x$$

5.

$$\mu_x = np = (1500)(0.35) = \boxed{525 \text{ coupons}}$$

6.

$$\sigma_x^2 = np(1-p) = (1500)(0.35)(0.65)$$

$$= 341.25$$

$$\sigma_x = \sqrt{341.25} = \boxed{18.4730 \text{ coupons}}$$

7.

$$y = (2.50)x$$

$$\mu_y = (2.50)\mu_x = (2.50)(525) = \boxed{\$1312.50}$$

8. Use Rule 1 for Variances:

$$\sigma^2_{a+bx} = b^2\sigma^2_x$$

$$y = (2.5)x \implies a = 0\ , b = 2.5$$

$$\sigma^2_y = (2.5)^2\ \sigma^2_x = (6.25)(341.25) = 2132.8125$$

$$\sigma_y = \sqrt{2132.8125} = \$46.1824 \approx \boxed{\$46.18}$$

9.

$$\mu_y - 2\sigma_y = 1312.50 - (2)(46.18)$$

$$= 1312.50 - 92.36 = \boxed{\$1220.14}$$

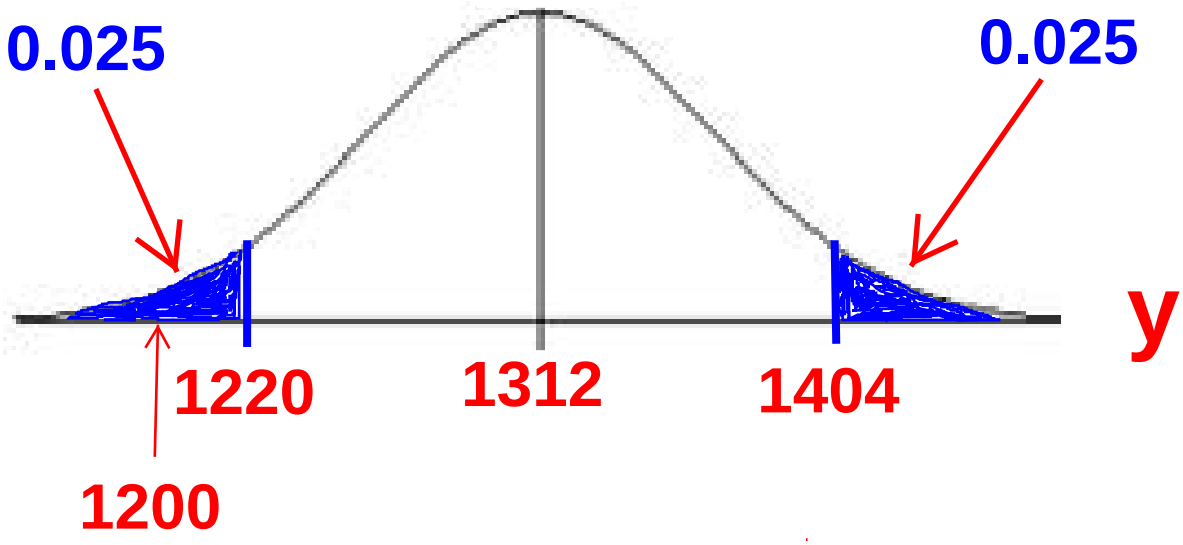
$$\mu_y + 2\sigma_y = 1312.50 + (2)(46.18)$$

$$= 1312.50 + 92.36 = \boxed{\$1404.86}$$

Now figure out the answer to Question 10! (You have 60 seconds.)

10. The correct answer is (f)

95% + 2.5% above + a little more below



Problem A Second Solution

Turn to Topic 6 Example 7 on Notebook p. 245 NOW !!

(If you're missing notes to T6 EX 7 hand-copy them in any TA or prof office hour!)

Problem A Second Solution

- Yang needs at least \$1200.
- Each coupon brings \$2.50 so he needs at least $1200/2.50 = 480$ coupons.
- x = number of coupons redeemed
  - x is Binomial (yes/no)
  - $p = 0.35$
  - $n = 100$ coupons/week $\times$ 15 weeks $= 1500$

$$P(x \geq 480) = P(x/n \geq 480/1500)$$

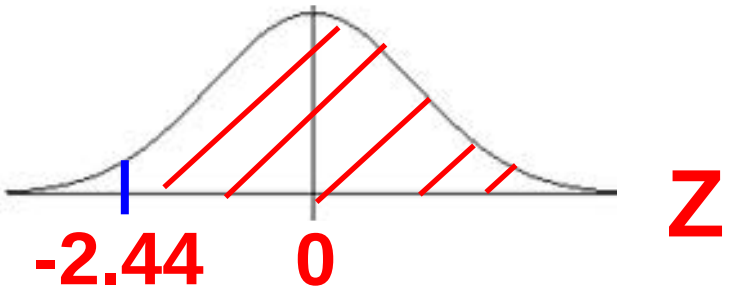
$$= P(\ \widehat{p}\ \geq 0.32) = ?$$

$$Z = \frac{\widehat{p} - p}{\sigma_{\widehat{p}}}$$

$$\sigma_{\widehat{p}} = \sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{(0.35)(0.65)}{1500}} = 0.0123$$

Use EX. 7 p. 245 Notebook to finish answer!

$$Z = \frac{0.32 - 0.35}{0.0123} = -2.44$$



$$P(Z \geq -2.44) = 1 - \text{Table}(-2.44)$$

$$= 1 - 0.0073 = \boxed{0.9927}$$

Problem B

Work Problem B ON YOUR OWN!

- **Use the Notebook and your neighbors!**
- **Check answers with TAs!**

(Don't let Prof. Blowhard down!)

Problem B

1. x = number of free throws made in April

2.

- $p = 0.80$
- $n = 5 \times 30 = 150$

3.

x = number of free throws made April 1
$p = 0.80$
$n = 5$

$$P(x = 4) = \left[{}_nC_x \right] p^x \ (1-p)^{n-x}$$

$$= \left[{}_5C_4 \right] (0.80)^4 \ (0.20)^1$$

$$= (5) \ (0.80)^4 \ (0.20) = \boxed{0.4096}$$

4.

x = number of free throws made April 1–5
$p = 0.80$
$n = 25$

$$\begin{aligned} P(x \geq 15) &= 1 - P(x < 15) \\ &= 1 - P(x \leq 14) \\ &= 1 - 0.006 = \boxed{0.994} \end{aligned}$$

5.

x = number of free throws made in April
$p = 0.80$
$n = 150$

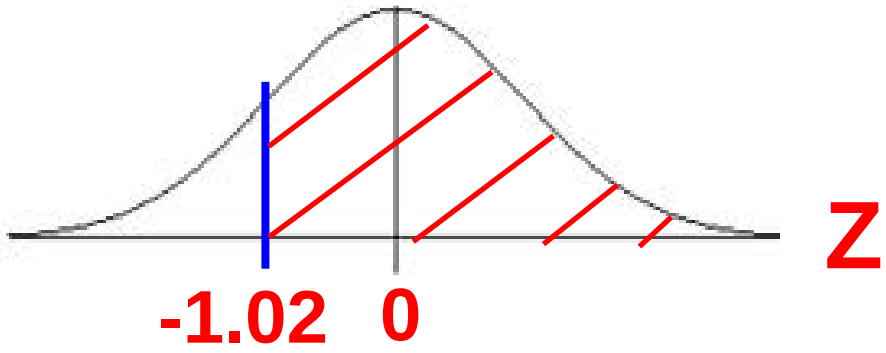
$$P(x \geq 115) = P(x/n \geq 115/150)$$

$$= P(\ \hat{p}\ \geq 0.7667) = \ ?$$

$$\sigma_{\widehat{p}} = \sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{(0.8)(0.2)}{150}} = 0.0327$$

$$Z = \frac{\widehat{p} - p}{\sigma_{\widehat{p}}} = \frac{0.7667 - 0.80}{0.0327} = -1.018$$

$$\implies \quad P(x \geq 15) = P(Z \geq -1.02)$$

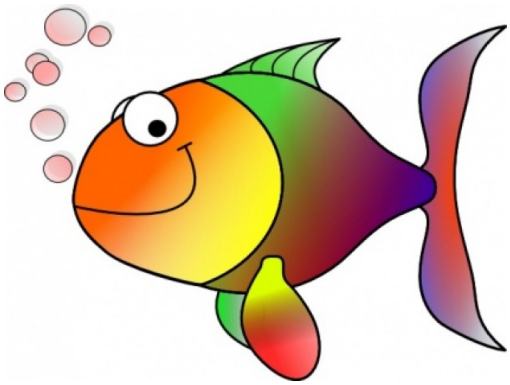


$$P(Z \geq -1.02) = 1 - \text{Table}(-1.02)$$

$$= 1 - .1539 = \boxed{0.8461}$$

Problem C

(Work Problem C with classmates/TAs now)



Problem C

1. x = weight of a fish in Iowa River, in kg

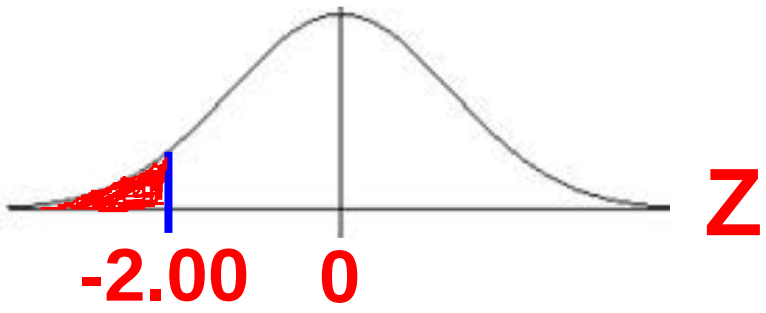
2.

- $\mu = 1.30$ kg
- $\sigma = 0.40$ kg

3.

$$P(x < 0.5) = ?$$

$$Z = \frac{x - \mu}{\sigma} = \frac{0.5 - 1.30}{0.40} = -2.00$$



$$P(Z < -2.00) = 0.0228 \implies \boxed{2.28\%}$$

4.

$$n = \ 63 \text{ fish}$$

$$P(\text{total weight} > 80)$$

$$= P(x_1 + x_2 + \cdots + x_{63} > 80)$$

$$= P\left(\frac{x_1 + x_2 + \cdots + x_{63}}{63} > 80/63\right)$$

$$= P(\bar{x} > 1.2698)$$

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{0.40}{\sqrt{63}} = \frac{0.4}{7.9372} = 0.0504$$

$$Z = \frac{\bar{x} - \mu}{\sigma_{\bar{x}}} = \frac{1.2698 - 1.30}{0.0504} = -0.5992$$

$$P(Z > -0.60) = 1 - \text{Table}(-0.60)$$

$$= 1 - .2743$$

$$= \boxed{0.7257}$$