EXAM 1 STT 315 Sp 06

Section number TA name

Student Number

Print name

Sign name

- Sit where you are asked to.
- Wait for the signal to begin.
- The exam lasts 45 min.
- Remain seated until given permission to move about. No exceptions.
- No extra papers, no calculators, cell phones put away.
- You must neither take the exam apart nor write on anything else.
- Stop writing at once when the signal is given and pass exam ahead.
- Keep your eyes on you own work. No talking.
- Avoid the appearance of flagrantly leaving your paper open to view.
- Point penalties will be exacted for answers given without substantiation.
- Point penalties will be exacted for writing after the signal to stop.
- Any person arriving more than 5 min late will not take the exam.
- Any person leaving without permission will be failed for the course.
- Any person present in a section exam but not enrolled there will be failed.
- Leave fractions unevaluated and do not reduce them.
- Points will be withdrawn for sloppy work.
- Show work in spaces provided. Record your answers in boxes provided.

P(OIL) = 0.3, P(+ | OIL) = 0.7, P(+ | OIL^c) = 0.2.

1. Determine P(−).

   P(OIL −) + P(noOIL −)

   P(OIL) P(− | OIL) + P(noOIL) P(− | noOIL)

   = .3 .3 + .7 .8 (e.g. P(− | noOIL) = 1 − .2)

2. Determine P(OIL | −).

   P(OIL −) / P(−)

   = .3 .3 / (.3 .3 + .7 .8)

***P*(OIL) = 0.5, *P*(OIL +) = 0.20.**

3. Determine P(OIL−).

   P(OIL) = P(OIL+) + P(OIL-)

   0.5 = 0.2 + P(OIL-)

   so P(OIL-) = 0.3

4. Determine P(− | OIL).

   P(OIL-) / P(OIL)

   = 0.3 / 0.5

Balls will be selected without replacement from {*B B B Y Y*}

5. Determine P(B2) using total probability (show all steps taking into account draw 1).

   P(B1 B2) + P(Y1 B2)

   = 3 / 5 2 / 4 + 2 / 5 3 / 4

6. Determine P(Y1 B2 B3).

   P(Y1) P(B2 | Y1) P(B3 | Y1 B2)

   = 2 / 5 3 /4 2 / 3

***P*(rain Sat) = 0.7, *P*(rain Sun) = 0.9, these two events are independent**

7. Determine P(rain Sat AND rain Sun).

   P(Sat) P(Sun | Sat) = P(Sat) P(Sun) (by independence)

   = 0.7 0.9

8. Determine P(rain Sat OR rain Sun).

   P(Sat) + P(Sun) - P(Sat Sun)

   = 0.7 + 0.9 - 0.7 0.9

Account imbalance X is normally distributed with expectation 100 and sd 2.

9. Determine the standard score of x = 102.22 (by hand).
   (102.22 - 100) / 2 = 2.22 / 2 = 1.11
10. Determine P(100 < X < 102.22) using the Z method (no continuity correction).

z	.01
1.1	0.3665

$r.v.\ X$ with $p(0) = 0.25,\ p(2) = 0.5,\ p(4) = 0.25.$

11. Determine E X^2
   $$\mathrm{E}\, X^2 = \sum x^2\, p(x) = 0^2\, 0.25 + 2^2\, 0.5 + 4^2\, 0.25 = 6$$
12. Determine Var X.
   $\mathrm{E}\ X = \sum x\ p(x) = 0\ \ 0.25 + 2\ \ 0.5 + 4\ \ 0.25 = 2$
   $\mathrm{Var}\ X = \mathrm{E}\ X^2 - (E\ X)^2 = 6 - 4 = 2$

$r.v.\ X_1,\ \ldots,\ X_{100}$ are independent samples of accounts with $E\,X = 5$, Var $X = 9$.

13. Determine E ($X_1 + X_2 + \ldots + X_{100}$).
   100 E X = 500 (on the average, the total of 100 plays is 500)
14. Determine sd ($X_1 + X_2 + \ldots + X_{100}$) (first get the variance).
   Var(total of 100 indep plays) = 100 Var X = 900
   sd(total of 100 independent plays) = 30 (root of variance)

data {3, 4, 5}

15. Determine the sample sd s for the above data.
   mean is 4
   root of $\frac{1}{3-1}((3-4)^2 + (4-4)^2 + (5-4)^2)$
   $= \sqrt{1} = 1$
16. Determine the sample mean ± margin of error.
   $4 \pm 1.96\ s / \sqrt{n}$
   $4 \pm 1.96\ 1 / \sqrt{3}$

The expected number of raisins in *a* cookie is 4 and the mix is random.

17. Sketch the normal approximation of the distribution of the number of raisins in a cookie (w/ labels).
   mean 4, sd $= \sqrt{\text{mean}} = 2$ (for Poisson) (draw normal curve)
18. Determine p(2), the probability that a cookie contains exactly two raisins.
   $p(2) = e^{-\text{mean}}\,\text{mean}^2 / 2! = e^{-4}\, 4^2 / 2! = 8\ e^{-4}$

A with – repl sample of 400 voters will be selected from a population of which 20 % favor a particular ballot proposal. Let r.v. X denote the number of voters in the sample favoring this proposal.

19. Determine the mean and s.d. of X.

Binomial n = 400, p = 0.2 is the distribution of X.

mean = np = 80

var = npq = 400 0.2 0.8 = 64

sd = root var = 8

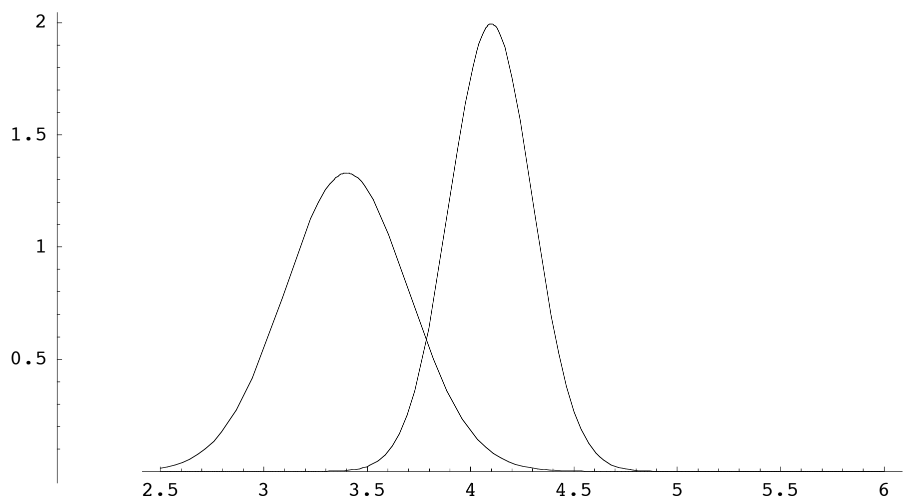
Wait times for customers follows an exponential distribution with mean 5 min.

20. Determine the probability that a customer waits longer than 10 minutes. You need not compute it.

$e^{-x/\text{mean}} = e^{-10/5} = e^{-2}$

data {3.4, 4.1}

21. Determine the density portrait for the above data using the figure below.



ans. Obtain the average height of the two curves (midway between them) at a few points on the horizontal axis then join these with a smooth curve.