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- Points will be withdrawn for sloppy work.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) = 0.2, P (- | OIL) = 0.1, P (- | OIL^C) = 0.6.

1. Determine P (+).
   P (OIL +) + P (noOIL +)
   = P (OIL) P (+ | OIL) + P (noOIL) P (+ | noOIL)
   = 0.2 (1 – 0.1) + 0.8 (1 – 0.6)
2. Determine P (OIL | +).
   P (OIL +) / P (+)
   = 0.2 0.9 / (0.2 0.9 + 0.8 0.4)

Cost to test 20 Cost to drill 100 Return from OIL 500, *P*(OIL) = 0.2.

3. Determine all four possible net returns from policy "test then drill if test + ."
   OIL+ – 20 – 100 + 500
   OIL– – 20 – 0 + 0
   noOIL+ – 20 – 100 + 0
   noOIL– – 20 – 0 + 0
4. Determine E (net return from policy "Just Drill (no test)").
   OIL 0.2 –100 + 500 = 400 product 80
   noOIL 0.8 –100 + 0 = –100 product –80
   E net = 80 – 80 = 0

(Note: I did not ask it, but the expected retrun from the policy "test but drill only if the test is +" would be 0.2 0.9 380 = 68.4.)

***A* ball will be selected from {*B*, *Y*, *Y*}.**
If this first ball is *B* then *a* second ball will be selected from {*G*, *G*, *Y*, *R*, *R*}.
If the first ball is *Y* then (instead) the second ball will be selected from {*G*, *R*}.

5. Determine P(B1 R2) (show all steps).
   P(B1) P(R2 | B1) = 1 / 3 2 / 5
6. Determine P(R2) (show all steps taking account of draw one).
   P(B1 R2) + P(Y1 R2) = 1 / 3 2 / 5 + 2 / 3 1 / 2

***P*(get raise) = 0.6, *P*(get promotion) = 0.55, *P*(get promotion | get raise) = 0.8.**

7. Determine whether getting the raise is independent of getting the promotion.
   No, since P(prom) ≠ P(prom | raise) (i.e. 0.55 ≠ 0.8)
8. Determine P(get raise OR get promotion).
   P(raise) + P(prom) - P(raise and prom)
   0.6 + 0.55 - 0.6 0.8 (P(raise and prom) is P(raise) P(prom | raise))

Number of orders X for filet of beef is approximately normal with mean 70 and $s.d.$ 20.

9. Determine the standard score of x = 85 (by hand).
   (85 – 70) / 20 = 3 / 4 = 0.75
10. Determine P(X > 85) using the Z method (no continuity correction).

z	.05
0.7	0.2734

   ans. .5 – 0.2734 (want > 85)

$r.v.\ X$ with $p(-1) = 0.18,\ p(0) = 0.64,\ p(1) = 0.18.$

11. Determine E X
   $\sum x\, p(x) = -1 \;\; 0.18 + 0 \;\; 0.64 + 1 \;\; 0.18 = 0$
12. Determine s.d. X (answer with s.d. not variance).
   E $X^2 = (-1)^2 \;\; 0.18 + 0^2 \;\; 0.64 + 1^2 \;\; 0.18 = 0.36$
   var X = E $X^2 - (E\,X)^2 = 0.36 - 0^2 = 0.36$
   sd = root var = 0.6

$r.v.\ X,\ Y$ are independent with $E\,X = 15,\ \text{Var}\,X = 9,\ E\,Y = 3,\ \text{Var}\,Y = 2.$

13. Determine E ($2\,X + 4\,Y - 12$).
   2 E X + 4 E Y – 12 = 2 (15) + 4 (3) – 12 = 30
14. Determine Variance(2 X + 4 Y –12). (strike off "–12")
   2^2 var X + 4^2var Y = 4 (9) + 16 (2) = 68

data {6, 8, 10}

15. Determine the sample s.d. s for the above data.
   mean is 8
   root of $\frac{1}{3-1}\left((6-8)^2 + (8-8)^2 + (10-8)^2\right)$ = root 4 = 2
16. Determine the sample mean ± margin of error.
   $8 \pm 1.96\ s / \sqrt{n} = 8 \pm 1.96\ (2) / \sqrt{3}$

The expected number of orders for *a* seldom chosen car variation is 3.

17. Sketch the normal approximation of the distribution of the number of orders for this variation (w/ labels).
   mean 3, sd $\sqrt{3}$ (for Poisson counts of rare events)
   sketch this normal
18. Determine an expression for p(4), the probability four such variations are ordered.
   $e^{-\text{mean}}\,\text{mean}^4 / 4! = e^{-3}\ 3^4 / 4!$

A with − repl sample of 400 voters has 160 favoring a particular ballot proposal.

19. Determine the sample percentage favoring the proposal and its margin of error.

pHAT = $\hat{p}$ = 160 / 400 = 0.4

$\hat{p} \pm 1.96\ \sqrt{\hat{p}\,\hat{q}}\ /\ \sqrt{n}$

$0.4 \pm 1.96\ \sqrt{0.4\ 0.6} / \sqrt{400}$ (or this times 100%, either is ok)

Two four sided dice labeled {1, 3, 4, 8} and {2, 5, 6, 7}.

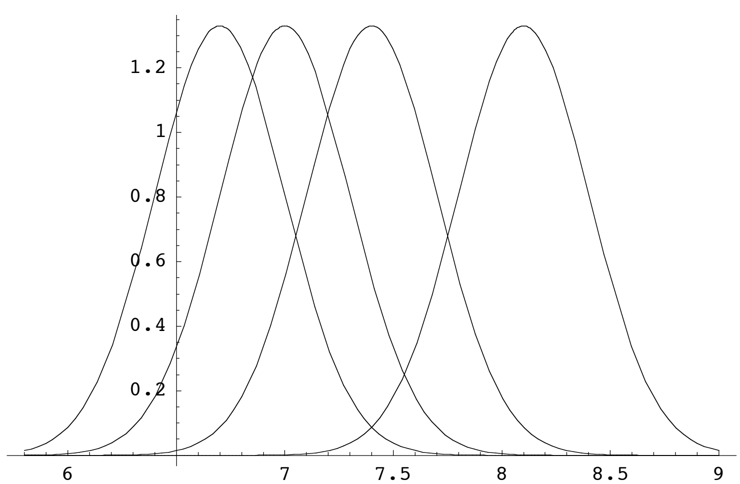
20. Determine the probability die {1, 3, 4, 8} throws a number larger than the other die when they are both tossed (enumerate cases).

	2	5	6	7
1				
3	*			
4	*			
8	*	*	*	*

ans. 6 / 16

data {6.7, 7.4, 6.8, 8.1}

21. Determine the density portrait for the above data using the figure below (first do for two pairs).



ans. Choose a point on the horizontal axis. Average the heights of the two left curves at this point (it is midway between those curves). Repeat for the two right curves at this point. Then take the average of these two averages. You now have the 4-fold average of the curve heights at this point. Repeat for several points on the horizontal axis. Smoothly join the resulting 4-fold averages. You have then plotted an approximation of the average heights of the four curves.