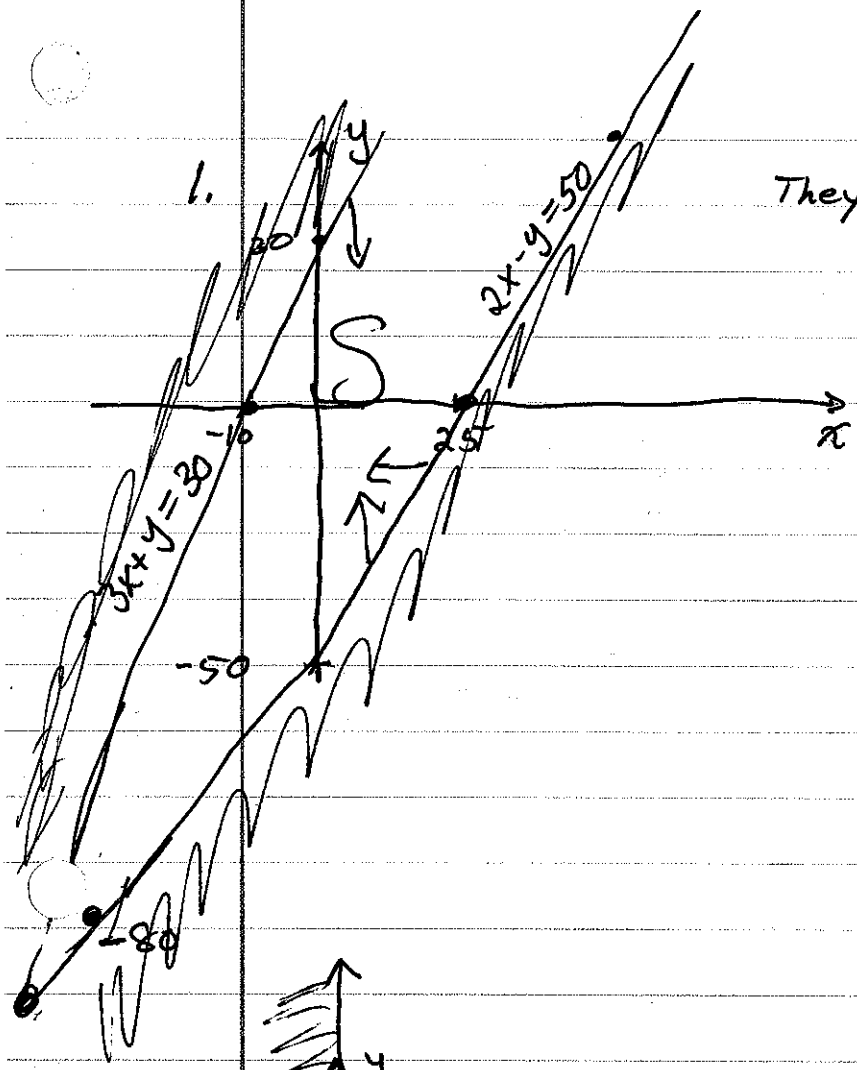
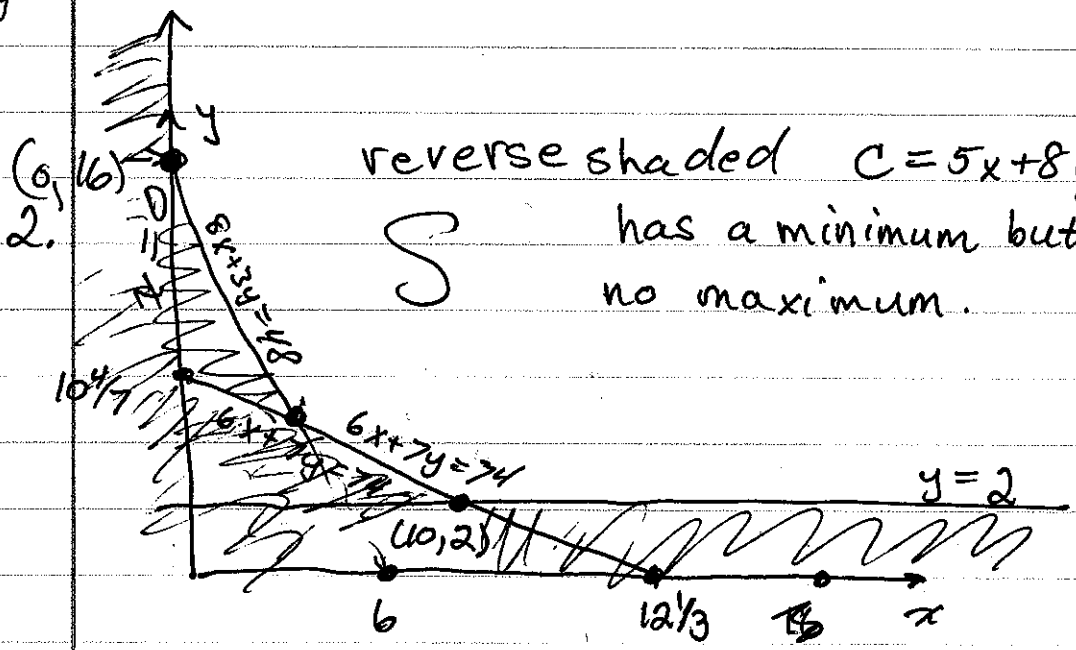
In Class Exam 2 Review Solutions

1.



They intersect at $(-80, -210)$

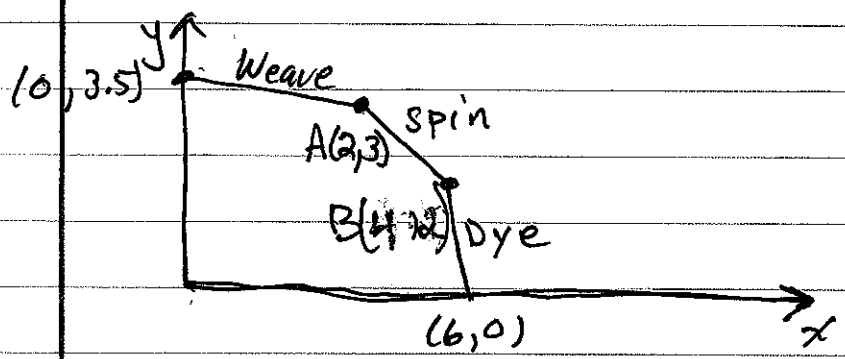
2.



reverse shaded $C = 5x + 8y$ has a minimum but no maximum.

3. Let x = # of sweaters
y = # of blankets

	x, Sw.	y, Bl		slope
Spin	1	2	8	$-1/2$ mid
Dye	1	1	6	-1 right
Weave	1	4	14	$-1/4$ top
Profit	20	30		



y-int of Weave line is $14/4 = 3\frac{1}{2}$
x-int of Dye line is $6/1 = 6$

Find A: $\text{rref}\begin{bmatrix} 1 & 2 & 8 \\ 1 & 4 & 14 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 3 \end{bmatrix}$

Find B: $\text{rref}\begin{bmatrix} 1 & 2 & 8 \\ 1 & 1 & 6 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 4 \\ 0 & 1 & 2 \end{bmatrix}$

corners	$20x + 30y = P$
(0, 3.5)	\$105
(2, 3)	\$130
(4, 2)	\$140
(6, 0)	\$120

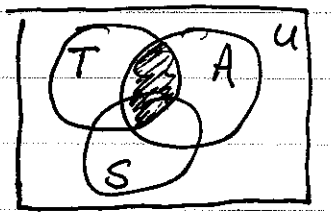
4 sweaters, 2 blankets
Profit \$140

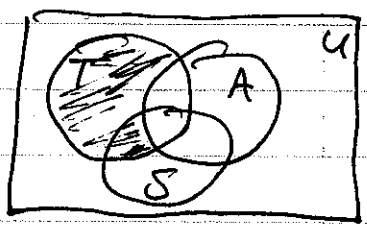
Are any hours leftover?
The optimal corner is on Spin line and Dye line but below Weave line.
Weaving hours used $= x + 4y = 4 + 4(2) = 12$
plug in $(4,2)$
There were 14 weaving hours available so $14 - 12 = 2$ leftover weaving hours.

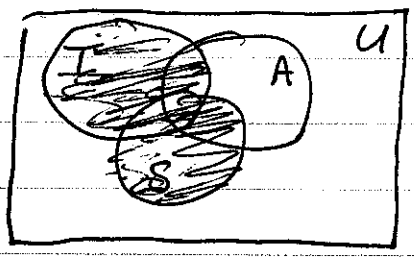
4. a) $T \cap A$ = "all the people in U who got a ticket and had an accident"

b) $T \cap A^C$ = "all the people in U who got a ticket but did not have an accident"

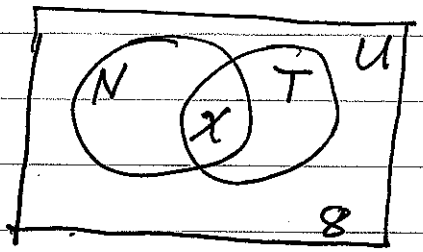
c) $T \cup S$ = "all the people in U who got a ticket or went over the speed limit"

a) 

b) 

c) 

5.



$n(N) = 20$

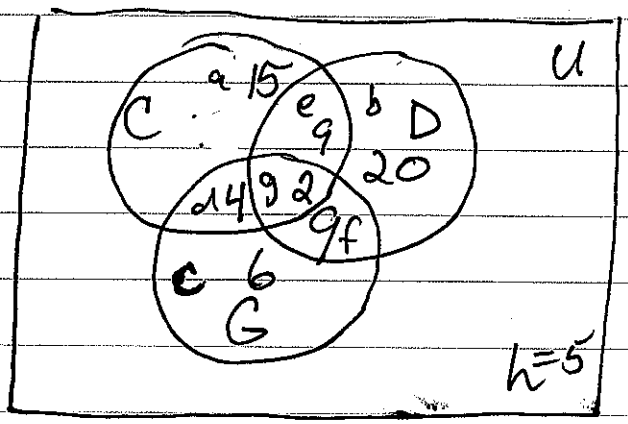
$n(T) = 32$

$n(N \cup T) = 37 = 45 - 8$

$52 - 37$

$= 15 = x$

6.



$n(U) = 70$

$h = 5$

a) $a + d + e + g = 30$ $a = 15$

$e = 9$

$g = 2$

$d + g = 6$ so $d = 4$

$b = 20$

$a + d + c = 25$ so $a + c = 21$

$c = 6$

$f = 70 - (15 + 20 + 6 + 4 + 9 + 2 + 5)$

$= 70 - 61 = 9$

b) $70 - 5 = 65$

c) $c + d + g + f = 21$

7. a) 10^6 since sections can be repeated, assuming all sections can have at least 6 people.

b) $10P6$ Assigning sections one to one — permutation

c) $10^6 - 10P6$ "Total" − "all different"

"Not all different"

= "At least 2 the same"

8. 12 ways to choose 1st letter.
11 ways for each other letter since you cannot repeat the letter just used.

$\boxed{12 \times 11^4}$

For example a b a b a is allowed.

9. a) 18 people can be lined up in $\boxed{18!}$ ways

b) $4!\,4!\,3!\,5!\,6!$

Arrange the 4 companies. Then arrange within each company

10. Missippi way $\frac{18!}{4!\,3!\,5!\,6!}$

or $C(18,4)\,C(14,3)\,C(11,5)$

11. a) S = "all the 3 long codes made from H, T"

$n(S) = 2^3 = 8$

b) S = "all 3-element subsets of the 5 letters"

example: If the letters are a, b, c, d, e

2 outcomes: $\{a,c,e\}, \{b,d,a\}$

$n(S) = 5C3 = 10$

c) For letters a, b, c, d, e, f

S = "3-long code from H, T paired with any 3-element subset of $\{a,b,c,d,e,f\}$"

2 outcomes: $((H,T,H), \{a,d,f\})$

$((T,T,T), \{b,c,e\})$

$n(S) = 2^3 \cdot (5C3) = 80$

12 a) No since $P(S) = .97 \neq 1$

b) $P(d) = 1 - P(\{a, b, c\}) = 1/4$

$P(a) = \frac{7}{12} - 1/4 = 1/3$ $\quad P(c) = \frac{1}{2} - 1/3 = 1/6$

$P(b) = 3/4 - 1/2 = 1/4$

S	a	b	c	d
P	1/3	1/4	1/6	1/4

13. a) $45C7 = n(S) \quad n(A^c) = 30C7$

$n(S) - n(A^c) = 45C7 - 30C7$

b) $(20C3)(10C4)$