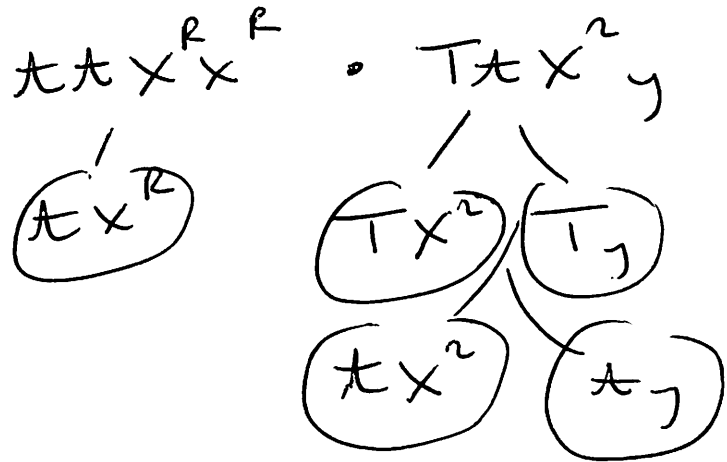


Genetics Problem Set #2

page 1

SOLUTIONS

(1) Sex-Linked
 R - red eyes
 r - white eyes
 X^r - female
 y - male
 T - tan
 t - ebony



	$T X^{r2}$	$T y$	$t X^{r2}$	$t y$
$t X^R$	$T t X^R X^{r2}$	$T t X^R y$	$t t X^R X^{r2}$	$t t X^R y$

Genotypes

$T t X^R X^{r2} - 1/4$
 $T t X^R y - 1/4$
 $t t X^R X^{r2} - 1/4$
 $t t X^R y - 1/4$

Phenotypes

Tan Red-eyed female $1/4$
 Tan Red-eyed male $1/4$
 Ebony Red-eyed female $1/4$
 Ebony Red-eyed male $1/4$

2 a)

R - round
 r - wrinkled
 Y - yellow
 y - green

$$\begin{array}{c}
 RRyy \\
 \swarrow \quad \searrow \\
 (Ry)
 \end{array}
 \times
 \begin{array}{c}
 rrYY \\
 \swarrow \quad \searrow \\
 (rY)
 \end{array}$$

	Ry
rY	RrYy

Genos
 RrYy - 1/1

Phenos
 Round yellow 100%

b)

$$\begin{array}{c}
 RrYy \\
 \swarrow \quad \searrow \\
 (R+)(R-)(+Y)(-Y)
 \end{array}
 \times
 \begin{array}{c}
 RrYy \\
 \swarrow \quad \searrow \\
 (R+)(R-)(+Y)(-Y)
 \end{array}$$


 punnett

b) continued

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	RY	Ry	rY	ry
RY	$RRYY$	$RRYy$	$RrYY$	$RrYy$
Ry	$RRYy$	$RRyy$	$RrYy$	$Rryy$
rY	$RrYY$	$RrYy$	$rrYY$	$rrYy$
ry	$RrYy$	$Rryy$	$rrYy$	$rryy$

Genotypes

$RRYY - 1/16$
 $RRYy - 2/16$
 $RrYY - 2/16$
 $RRyy - 1/16$
 $RrYy - 4/16$
 $Rryy - 2/16$
 $rrYY - 1/16$
 $rrYy - 2/16$
 $rryy - 1/16$

 $16/16$

Phenotypes

Round yellow - $9/16$
 Round green - $3/16$
 Wrinkled yellow - $3/16$
 Wrinkled green - $1/16$

 $16/16$

$9:3:3:1$

c) $RrYy \cdot rrYy$

$\begin{matrix} RY \\ (Ry) \\ (rY) \end{matrix}$
 $\begin{matrix} rY \\ (rY) \\ (ry) \end{matrix}$

	Ry	ry
rY	$RrYy$	$rrYy$
ry	$Rryy$	$rryy$

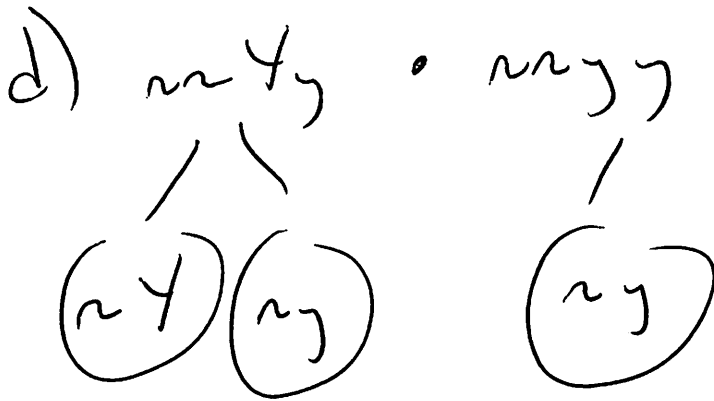
Genotypes

$RrYy - 1/4$
 $Rryy - 1/4$
 $rrYy - 1/4$
 $rryy - 1/4$

 $1/1$

Phenotypes

Round yellow - $1/4$
 Round green - $1/4$
 Wrinkled yellow - $1/4$
 Wrinkled green - $1/4$



	rY	ry
ry	$rrYy$	$rryy$

GENOTYPES

$rrYy - 1/2$

$rryy - 1/2$

Phenotypes

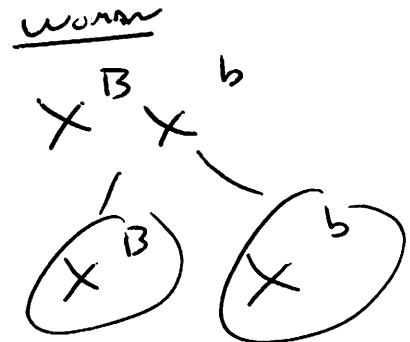
wrinkled yellow - $1/2$

wrinkled green - $1/2$

(3)

B - normal vision
 b - color blind

X - female
 Y - male



Man's mother - $X^B X^b$

Woman's father - $X^b Y$

→ Punnett

(3) continued

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	X^b	γ
X^B	Bb $X X$	$X^B \gamma$
X^b	bb $X X$	$X^b \gamma$

Genos

$X^B X^b - 1/4$

$X^b X^b - 1/4$

$X^B \gamma - 1/4$

$X^b \gamma - 1/4$

Phenotype

Normal Girl - $1/4$

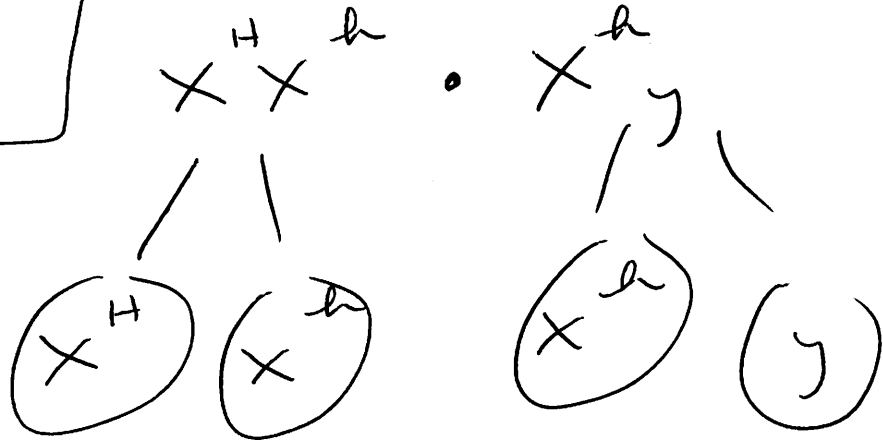
CB Girl - $1/4$

Normal Boy - $1/4$

CB Boy - $1/4$

25% chance of a color-blind daughter
and 25% chance of color-blind son

(4) H - normal clotting
 h - hemophilia
 X - female
 y - male
 Woman's father - $X^h y$



	X^H	X^h
X^h	$X^H X^h$	$X^h X^h$
y	$X^H y$	$X^h y$

Genotypes

Normal girl - $1/4$
 Hemophil girl - $1/4$
 Normal boy - $1/4$
 Hemophil boy - $1/4$

Phenotypes

$X^H X^h$ - $1/4$
 $X^h X^h$ - $1/4$
 $X^H y$ - $1/4$
 $X^h y$ - $1/4$

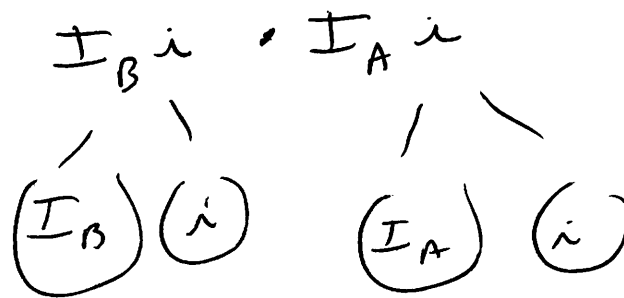
Of the girls, half ($\frac{1}{2}$)
 would be hemophiliac.

$$\frac{1}{4} + \frac{1}{4} = \frac{2}{4} \text{ of kids are girls}$$

and $1/4$ is half of $\frac{2}{4}$

5

$I_A - A$
$I_B - B$
$i - O$
$I_A I_B - AB$



child = ii
 mother must be $I_B i$

Suspect #1 = $I_A I_A$
 or
 $I_A i$

	I_B	i
I_A	$I_A I_B$	$I_A i$
i	$I_B i$	ii

Suspect #2 = $I_A I_B$
 DOES NOT
 HAVE an "i" to give
 "ELIMINATED"

Pheno

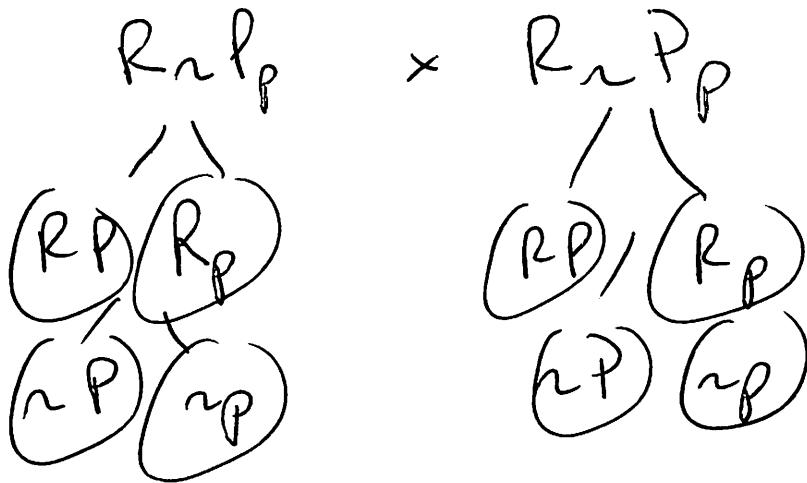
$I_A I_B$	$1/4$
$I_B i$	$1/4$
$I_A i$	$1/4$
ii	$1/4$

Geno

AB	$1/4$
B	$1/4$
A	$1/4$
O	$1/4$

Suspect #2 eliminated.
 If Suspect #1 was heterozygous
 ($I_A i$), there is a 25% chance
 of a type O child with
 a $I_B i$ woman.
 Suspect #1 most likely

(6) R - rose comb
 r - single comb
 P - pea comb
 p - single comb
 RP - both present
 sne walnut



	RP	Rp	rP	rp
RP	RRPP	RRPp	RrPP	RrPp
Rp	RRPp	RRpp	RrPp	Rrpp
rP	RrPP	RrPp	rrPP	rrPp
rp	RrPp	Rrpp	rrPp	rrpp

—

(6) continued

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Genotypes

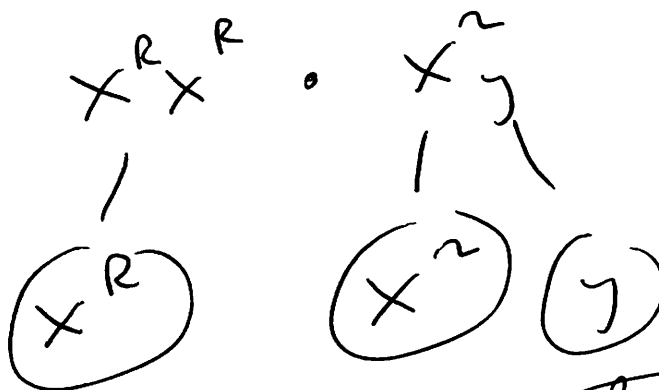
$RRPP - 1/16$
 $RrPP - 2/16$
 $RrPp - 2/16$
 $RrPp - 4/16$
 $Rrpp - 1/16$
 $Rrpp - 2/16$
 $rrPP - 1/16$
 $rrPp - 2/16$
 $rrpp - 1/16$
16/16

Phenotypes

Walnut (R+P) - $9/16$
 Rose comb - $3/16$
 Pea comb - $3/16$
 Single - $1/16$

9:3:3:1

(7) R - red
 r - white
 X - female
 Y - male



	$X^{\sim}$	Y
X^R	$R^{\sim}$	R^R
X	XX	XY

Genos

$X^R X^{\sim} - 1/2$
 $X^R Y - 1/2$

Phenos

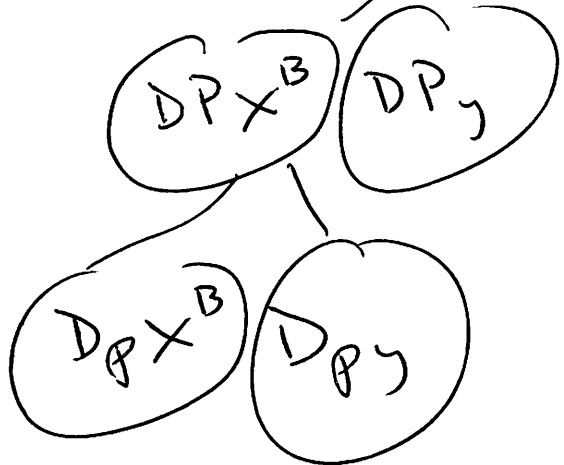
Red eyed female $1/2$
 Red eyed male $1/2$

- ⑧ P-purple
 p-gray
 Pp-spotted
 B-bitting
 b-friendly
 X⁺-female
 y-male
 D-dwarf
 d-normal

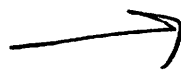
sex
linked

$$DDPpX^B y \cdot ddppX^b X^b$$

$$dpX^b$$



	DPX^B	DPy	DPX^B	DPy
dpX^b	$DDPpX^B X^b$	$DdPpX^b y$	$DdppX^B X^b$	$DdppX^b y$



Genotypes

$$DDPp \times Bx^b - 1/4$$

$$DdPp \times y^b - 1/4$$

$$Ddpp \times Bx^b - 1/4$$

$$Ddpp \times y^b - 1/4$$

Phenotypes

Dwarf ~~spotted~~ female that bites $1/4$

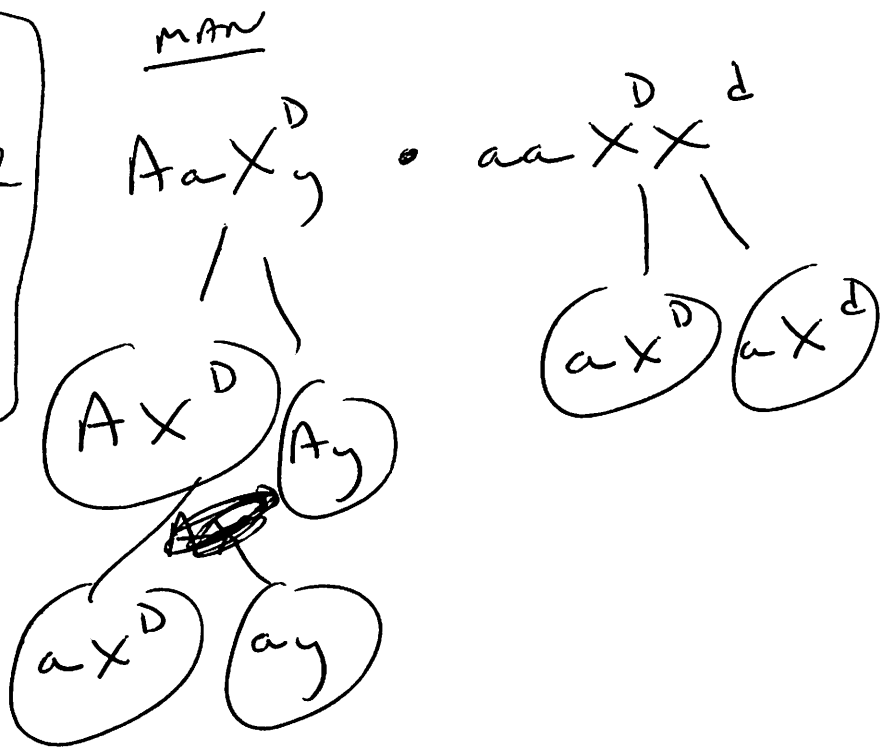
Dwarf spotted friendly male $- 1/4$

Dwarf gray biting female $- 1/4$

Dwarf gray friendly male $- 1/4$

- (9) A - normal pigment
a - albino
D - defective enamel
d - normal enamel
X - female
y - male

Man's mother - aa
Woman's father - x^D
Woman's mother - $x^a x^D$



→ Punnett.

(9) continued

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	AX^D	Ay	aX^D	ay
aX^D	$AaX^D X^D$	$AaX^D y$	$aaX^D X^D$	$aaX^D y$
aX^d	$AaX^D X^d$	$AaX^d y$	$aaX^D X^d$	$aaX^d y$

Genos

- $AaX^D X^D - 1/8$
- $AaX^D X^d - 1/8$
- $AaX^D y - 1/8$
- $AaX^d y - 1/8$
- $aaX^D X^D - 1/8$
- $aaX^D X^d - 1/8$
- $aaX^D y - 1/8$
- $aaX^d y - 1/8$

Phenotypes

- Normal female defective teeth $2/8$
- Normal male defective teeth $1/8$
- Normal male normal teeth $1/8$
- Albino female defective teeth $2/8$
- Albino male defective teeth $1/8$
- Albino male normal teeth $1/8$

8/8