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Assignment # 3

a)
$$\begin{bmatrix} 0 & & & \\ 1 & 0 & & \\ 0 & 1 & 0 & \\ 1 & 0 & 1 & 0 \end{bmatrix}$$

b) $d(i,j) = \frac{r+s}{q+r+s}$

$d(J,A)$

	M_1	M_2	F
$J(i)$	1	1	1
$A(j)$	1	0	1

$q=2, r=1, s=0$

$d(J,A) = \frac{1+0}{2+1+0} = 0.333$

$d(J,S)$

	M_1	M_2	F
$J(i)$	1	1	1
$S(j)$	0	1	1

$q=2, r=1, s=0$

$d(J,S) = 0.333$

$d(J,T)$

	M_1	M_2	F
$J(i)$	1	1	1
$T(j)$	1	1	1

$q=3, r=0, s=0$

$d(J,T) = \frac{0}{3} = 0$

$d(A,S)$

	M_1	M_2	F
$A(i)$	1	0	1
$S(j)$	0	1	1

$q=0, r=1, s=1$

$d(A,S) = \frac{1+1}{0+1+1} = \frac{2}{2} = 1$

$d(A,T)$

	M_1	M_2	F
$A(i)$	1	0	1
$T(j)$	1	1	1

$q=2, r=0, s=1$

$d(A,T) = \frac{0+1}{2+1+0} = \frac{1}{3} = 0.333$

$d(S,T)$

	M_1	M_2	F
$S(i)$	0	1	1
$T(j)$	1	1	1

$q=2, r=0, s=1$

$d(S,T) = \frac{0+1}{2+0+1} = \frac{1}{3} = 0.33$

	J	A	S	T
J	0			
A	0.33	0		
S	0.33	1	0	
T	0	0.33	0.330	

c) $d(J,A) = \frac{|85-88|}{99-70} = \frac{3}{29} = 0.103$

$d(J,S) = \frac{|85-29|}{99-70} = \frac{15}{29} = 0.517$

$d(J,T) = \frac{|85-99|}{99-70} = \frac{14}{29} = 0.483$

$d(A,S) = \frac{|88-70|}{99-70} = \frac{18}{29} = 0.621$

$d(A,T) = \frac{|88-99|}{99-70} = \frac{11}{29} = 0.379$

$d(S,T) = \frac{|70-99|}{99-70} = \frac{29}{29} = 1$

	J	A	S	T
J	0			
A	0.103	0		
S	0.517	0.621	0	
T	0.483	0.379	1	0

d) $d(i,j) = \frac{p-m}{p}$ p = # attr, m = # matches

$d(J,A) = \frac{1-0}{1} = 1$

$d(J,S) = \frac{1-1}{1} = 0$

$d(J,T) = \frac{1-1}{1} = 0$

$d(A,S) = \frac{1-0}{1} = 1$

$d(A,T) = \frac{1-0}{1} = 1$

$d(S,T) = \frac{1-1}{1} = 0$

	J	A	S	T
J	0			
A	1	0		
S	0	1	0	
T	0	1	0	0

e) if $a_i = 1 \Rightarrow 0$

Good = 2 $\Rightarrow 0.5$

Excellent = 3 $\Rightarrow 1$

Euclidean dist..

$d(J,A) = \sqrt{(0-0.5)^2} = 0.5$

$d(J,S) = \sqrt{(0-1)^2} = 1$

$d(J,T) = \sqrt{(0-1)^2} = 1$

$d(A,S) = \sqrt{(0.5-1)^2} = 0.5$

$d(A,T) = \sqrt{(0.5-1)^2} = 0.5$

$d(S,T) = \sqrt{(1-1)^2} = 0$

	J	A	S	T
J	0			
A	0.5	0		
S	1	0.5	0	
T	1	0.5	0	0

f)

	Gender	M1, M2, F	Q1	Health	Car Color
d(J, A)	1	0.333	0.103	1	0.5

$\delta = 1 \quad d(J,A) = \frac{1(1)+1(0.333)+1(0.103)+1(1)+1(0.5)}{7}$

$d(J,A) = 0.414$

g)

	Gender	M1, M2, F	Q1	Health	Car color
d(J, S)	0	0.333	0.517	0	1

$d(J,S) = \frac{1(0)+1(0.333)+1(0.517)+1(0)+1(1)}{7}$

$d(J,S)\ 0.264$