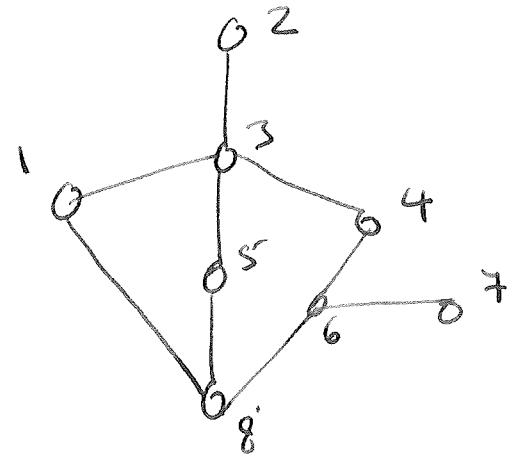


Find betweenness centrality of vertex 5, v_5

$P_{uw}(v_5)$ = # shortest u-w paths through v_5

[Note if uw is the shortest u-w path & edge uw so does not go through v_5.

Note shortest 3-8 path has length 2; there are two walks: 3-1-8 and 3-5-8, one through v_5

So for the (u,w) pair (3,8) $P_{uw}(v_5)/P_{uw} = 1/2$]

We consider (u,w) pairs; $u \neq w$, $u \neq v_5 \neq w$.

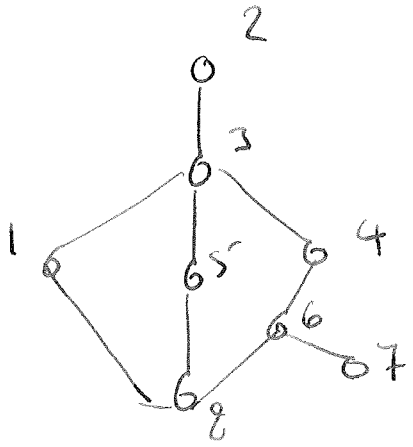
(u,w)	$P_{uw}(v_5)$	P_{uw}	$P_{uw}(v_5)/P_{uw}$
(1,2)	0		
(1,4)	0		
(1,6)	0		
(1,7)	0		
(2,4)	0		
(2,6)	0		
(2,7)	0		
(2,8)	1	2	1/2
(3,6)	0		
(3,7)	0		
(3,8)	1	2	1/2
(4,7)	0		
(4,8)	0		
(7,8)	0		

$\sum P_{uw}(v_5)/P_{uw} = 1$

$n^2 - 3n + 2 = (n-1)(n-2)$

$= 7 \times 6 = 42$

$B_{v_5} = \frac{2 \times 1}{42} = \frac{1}{21}$



B_{v_3}

Pairs	$P_{uw}(v_3)$	P_{uw}	$P_{uw}(v_3)/P_{uw}$
12	1	1	1
14	1	1	1
15	1	2	1/2
16	0		
17	0		
24	1	1	1
25	1	1	1
26	1	1	1
27	1	1	1
28	2	2	1
45	1	1	1
47	0		
48	0		
56	0		
57	0		
78	0		

$\sum P_{uw}(v_3)/P_{uw}$

$= 8\,1/2 = 17/2$

$(n-1)(n-2) = 42$

$B_r = \dfrac{2 \times 17/2}{42} = \dfrac{17}{42}$.