2

(87) points : { 5, 10, 15, 20, 25, 30, 35 }

assume $k = 2$

given

$m_1 = 15$ $\quad$ $m_2 = 32$

$K_1 = \{5, 10, 15, 20\}$ $\quad$ $K_2 = \{25, 30, 35\}$

$|25 - 35| = 10$ $\quad$ $|25 - 32| = 7$

$K_1 = m_1 = \frac{5+10+15+20}{4}$ $\quad$ $K_2 = m_2 = \frac{25+30+35}{3}$

$m_1 = 12.4 \approx 12$ $\quad$ $= 30$

$m_1 = 12$ $\quad$ $m_2 = 30$

$K_1 = \{5, 10, 15, 20\}$ $\quad$ $K_2 = \{25, 30, 35\}$

$|20-12| = 8$ $\quad$ $|20-30| = 10$

$\overline{K_1} = m_1 = 12.4 \approx 12$ $\quad$ $\overline{K_2} = m_2 = 30$

so, previous cluster mean is same as new cluster mean so the final cluster is

(a) $K_1 = \{5, 10, 15, 20\}$

$K_2 = \{25, 30, 35\}$

(b) Calculate the SSE for each of centroid

for first centroid (15, 32)

$SSE_1 = (15-5)^2 + (15-10)^2 + (15-15)^2 + (15-20)^2 + (32-25)^2 + (30-32)^2 + (35-32)^2$

$= 100 + 25 + 25 + 49 + 64 + 9.$

$= 372$

for second centroid (12, 30)

$SSE_2 = (12-5)^2 + (12-10)^2 + (12-15)^2 + (12-20)^2 + (30-25)^2 + (30-30)^2 + (30-35)^2$

$= 49 + 4 + 9 + 64 + 25 + 25$

$= \boxed{176}$

SSE_2 of the second clustering is lower

$\Rightarrow$

(7points) (2,2), (4,4), (5,5), (6,6), [redacted], (9,9), (0,4)

(4,0)

(9) c1 : { (2,2), (4,4), (6,6) }

c2 : { (0,4), (4,0) }

c3 : { (5,5), (9,9) }

The above cluster are result for first iteration :-

So, for second iteration :-

finding centroid [redacted] for data points ● in cluster c1, c2 & c3

$c_1 = ((2+4+6)/3, (2+4+6)/3)$

$= (4,4)$

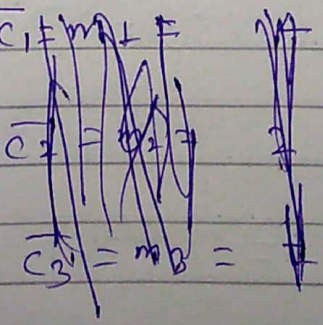
$c_2 = ((0+4)/2, (4+0)/2) = (2,2)$

$c_3 = ((5+9)/2, (5+9)/2) = (7,7)$

Hence, $c_1 = (4,4)$

$c_2 = (2,2)$

$c_3 = (7,7)$



[redacted]

(4,4) (5,5)

$(-)^2$

$C_1 = \{(4,4), (5,5)\}$

$C_2 = \{(2,2), (0,4), (4,0)\}$

$C_3 = \{(6,6), (9,9)\}$

SSE = $(4-4)^2 + (4,4)^2 + (4-5)^2 + (4-5)^2$
$+ (2-2)^2 + (2-2)^2 + (2-0)^2 + (2-4)^2 +$
$(2-4)^2 + (2-0)^2 +$
$(7-6)^2 + 6.$
$(2-0)^2$ $(2-4)^2$
4 4

SSE = $(4-5)^2 + (4-5)^2 + (4-5)^2 + (4-5)^2$
$+ (2-0)^2 + (2-4)^2 +$

SSE = $1 + 1 + 1 + 1$
$+ 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4$
$+ (7-6)^2 + (7-6)^2 + 1 + 1 +$

$(7-9)^2 + (7-9)^2 + 4 + 4$

= ~~40 + 16 + 40~~
$= 4 + 32 + 4 + 16$

$= 56$