Chapter 14 homework solutions (day 2)

1 a) **B must win**, since $a = 8000$ and $b = 10{,}400$, make B the high bidder.

b) for fair, $\boxed{4000 \le x \le 5{,}200}$

c) using q: $q = \frac{10{,}400}{18{,}400} = \frac{104}{184} = \frac{13}{23}$

notice $q = \frac{13}{23} > \frac{1}{2}$, so each gets more than a fair share

$x_A = \frac{13}{23}(8000) \approx \$4521.74$

$x_B = \frac{13}{23}(10{,}400) \approx \$5878.26$

$10{,}400$ ✓

So B pays A $4521.74

using $\frac{w}{m}$: $m = \frac{8000 + 10{,}400}{2} = 9{,}200$

so $\frac{w}{m} = \frac{10{,}400}{9{,}200} = \frac{104}{92} = \frac{26}{23}$

$x_A = \frac{26}{23}(4000) = \$4521.74$

$x_B = \frac{26}{23}(5{,}200) = \$5878.26$

Same result!

notice $\frac{w}{m} = \frac{26}{23} > 1$, so each gets more than a fair share

3 a) **C must win**, since C is high bidder ($a = 80$, $b = 60$, $c = 100$, $d = 80$ ... all in thousands)

b) A gets it. For equitable,

using q: $q = \frac{80}{80 + 60 + 100 + 80} = \frac{80}{320} = \frac{1}{4}$ so everyone gets exactly a fair share.

$x_A = \frac{1}{4}(80) = \boxed{20}$ $x_B = \frac{1}{4}(60) = \boxed{15}$ $x_C = \frac{1}{4}(100) = \boxed{25}$ $x_D = \frac{1}{4}(80) = \boxed{20}$.

notice sum of payouts is $20 + 15 + 25 + 20 = 80 = w$ ✓

using $\frac{w}{m}$: $m = \frac{320}{4} = 80$, $\frac{w}{m} = \frac{80}{80} = 1$ so everyone get exactly a fair share

$x_A = 1\left(\frac{80}{4}\right) = 20$ $x_B = 1\left(\frac{60}{4}\right) = 15$ $x_C = 1\left(\frac{100}{4}\right) = 25$

and $x_D = 1\left(\frac{80}{4}\right) = 20$

Same result.

c) **yes, it is fair.**