Homework 2

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1. **Truthfulness in Stable Marriage**

   A preference list exists such that a woman can lie and achieve a better outcome. Such a list is as follows:

$\mathbf{m_1}$:	(w_a, w_b, w_c)	$\mathbf{w_a}$:	(m_2, m_1, m_3)
$\mathbf{m_2}$:	(w_b, w_a, w_c)	$\mathbf{w_b}$:	(m_1, m_2, m_3)
$\mathbf{m_3}$:	(w_a, w_b, w_c)	$\mathbf{w_c}$:	(m_1, m_2, m_3)

   Normally, this would result in the set:

   $$\{(m_1, w_a), (m_2, w_b), (m_3, w_3)\} \tag{0.1}$$

   However, w_a can claim (m_2, m_3, m_1), resulting in the set:

   $$\{(m_1, w_b), (m_2, w_a), (m_3, w_c)\} \tag{0.2}$$

   The set of stable marriages contains the pair (m_2, w_a), which is w_a first choice of partner.

2. **Running Times**

   With 10^{12} ops / sec, we can run $\gamma = 3.6 * 10^{15}$ ops / hour.

   (a) $n = \sqrt{\gamma} = 6 * 10^7$

   (b) $n = \sqrt[6]{\gamma} = 391$

   (c) $n = \sqrt{\gamma/5555} = 805024$

   (d) $n^3 * log_2 n \rightarrow n = 60955$ (assuming log base two)

   (e) $n = \log_2 \gamma = 51$

3. **Efficiency**

    (a) Yes, No, No, A_1
    (b) No, Yes, No, A_2
    (c) Yes, No, No, A_1
    (d) Yes, Yes, Yes, A_2
    (e) Yes, No, No, A_1