ASSIGNMENT 1: work for defining rutime functions

log-log approximating $T(n) = Cn^p$

$$p = \frac{T'(n_2) - T'(n_1)}{n_2 - n_1} \;\; \& \;\; C = 2^{-n_1 p + T'(n_1)}$$

$T_A(n)$: $\overset{1000}{(9.96578, 6.9728)}$ & $\overset{1200}{(10.2288, 7.53138)}$

$$p = \frac{7.53138 - 6.9728}{10.2288 - 9.96578} = \frac{0.55858}{0.26302} = 2.123716828$$

$$C = 2^{(-9.96578)(2.1237..) + (6.9728)} = 2^{(-21.1644..)+(6.9728)} = 2^{-14.1916...} = 5.3440954 82 \times 10^{-5}$$

$$T_A(n) = (5.344095 \times 10^{-5})\, n^{2.123716828}$$

$T_B(n)$: $\overset{1000}{(9.96578, 11.2137)}$ & $\overset{1200}{(10.2288, 11.8427)}$

$$p = \frac{11.8427 - 11.2137}{10.2288 - 9.96578} = \frac{0.629}{0.26302} = 2.391453121$$

$$C = 2^{(-9.96578)(2.391453121) + (11.2137)} = 2^{(-23.8326..)+(11.2137)} = 2^{-12.618..} = 1.589658312 \times 10^{-4}$$

$$T_B(n) = (1.58965 \times 10^{-4})\, n^{2.391453121}$$

$T_C(n)$: $\overset{1000}{(9.96578, 5.32193)}$ & $\overset{1200}{(10.2288, 5.85798)}$

$$p = \frac{5.85798 - 5.32193}{10.2288 - 9.96578} = \frac{0.53605}{0.26302} = 2.038057942$$

$$C = 2^{(-9.96578)(2.0380...) + (5.32193)} = 2^{(-20.3108..)+(5.32193)} = 2^{-14.9889...} = 3.075313302 \times 10^{-5}$$

$$T_C(n) = (3.075313 \times 10^{-5})\, n^{2.038057942}$$

how long each would run w/ an input of $n = 10^6$:

$T_A(10^6) = (5.344095 \times 10^{-5})(10^6)^{2.123716} = 295,236,582.706$ ms $= 4920.6097$ minutes

$T_B(10^6) = (1.589658 \times 10^{-4})(10^6)^{2.391453} = 35,483,111,831$ ms $= 591,385.1972$ minutes

$T_C(10^6) = (3.075313 \times 10^{-5})(10^6)^{2.038057} = 52,027,304.275$ ms $= 867.1217$ minutes