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$n = A.length$ pg 25

2) BUBBLE SORT polynomial time

		Cost	times	solved / OK AS
1	for $i = 1$ to $A.len - 1$	c_1	$n-1$	n
2	for $j = len$ downto $i+1$	c_2	$(n-2)\frac{1}{2}(n-1)$	$\frac{n(n+1)}{2} - 1$
3	if	c_3	$(n-2)\frac{1}{2}(n-2)$	$\frac{n(n-1)}{2}$
4	=	c_4		$\frac{n(n-1)}{2}$

$$T(n) = c_1 n \qquad c_1\ n$$
$$+ c_2\left(\frac{n(n+1)}{2} - 1\right) \qquad c_2/2\ n^2 + c_2/2\ n \quad - c_2$$
$$+ c_3\left(\frac{n(n-1)}{2}\right) \qquad c_3/2\ n^2 - c_3/2\ n$$
$$+ c_4\left(\frac{n(n-1)}{2}\right) \qquad c_4/2\ n^2 - c_4/2\ n$$

$$T(n) = \frac{c_2+c_3+c_4}{2} n^2 + \frac{c_2}{2} n - \frac{c_3+c_4}{2} n - c_2$$

$$T(n) = \Theta n^2$$

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3) Show that when $|x| \le 1$, we have the approximation

$$e^x = 1 + x + \Theta(x^2)$$

pg 56 properties of exponential functions

for $|x| \le 1$, $1 + x \le e^x \le 1 + x + x^2$

when $x \to 0$, the approximation of e^x by $1 + x$ is good

$$e^x = 1 + x + \Theta(x^2)$$