

Homework 7

due October 29, 2024

We want to layout a paragraph of text using a fixed-sized font. Each line can hold up to n characters. Words on a line are separated by exactly one blank, even if the word ends in a punctuation symbol. We define the *penalty* for a line to be b^2 , where b is the number of blank letters at the end. The penalty of a paragraph is the sum of the line penalties with exception of the last line. For example:

w	h	e	r	e	a	s		r	e	c	o	g	n	i	t	i	o	n		o	f		t	h	e			
i	n	h	e	r	e	n	t		d	i	g	n	i	t	y		a	n	d		o	f		t	e	e		
e	q	u	a	l		a	n	d		i	n	a	l	i	e	n	a	b	l	e		r	i	g	h	t	s	
o	f		t	h	e		h	u	m	a	n		f	a	m	i	l	y		i	s		t	h	e			
f	o	u	n	d	a	t	i	o	n		o	f		f	r	e	e	d	o	m	,							
j	u	s	t	i	c	e		a	n	d		p	e	a	c	e		i	n		t	h	e					
w	o	r	l	d	,																							

has a total penalty of $3^2 + 2^2 + 1^2 + 3^2 + 7^2 + 5^2$.

Describe in detail a dynamic programming approach to find the minimal-penalty layout of a paragraph. You are given the total number n of characters and the array of words. (If necessary, the words end in a punctuation mark.)