



## Texting, Texting, One Two Three (20 marks)

The respected espionage-supply company Z Enterprises is about to release a new version of their Z1200 model wristwatch, popular among spies (and also high-school students) for its ability to discreetly send text messages. Although the Z1200 had only four buttons in total, the user could input characters by pressing three-button sequences. For example, if we call the buttons 1, 2, 3, and 4, a was 112, A was 113, b was 114, SPACE was 111, the END sequence that finished the message was 444, etc.

The Z1300 has the same button layout, and it was planned that it would use the same text-input method. In the design stage, however, a new engineer proposed that he could significantly reduce the number of button presses needed for each message. Unfortunately, the manual had already been printed and the new Z1300 shipped without any information regarding how to use this new input method. But if you were a spy, you could work out how it works just from a few examples – couldn't you? Here are the examples:

### Testing testing

332221432241423411222143224142341331

### Does anyone copy

3323332214313142343324221124232342343331

### be vewy vewy qwiet im hunting wabbits

234121123422134434312342213443431234423444121221412431231241422241423  
4113443123412341412243331

### Mission failed Tango not eliminated

332434143434132421244314123221233133223142341321423222121232412434142  
312221233331

### my boss Z is a pain in the

24334312341324343133234441414313113423141421414212223121331

### uh oh no backspace on this thing

241231132231142321234131242234343342312422113242122231414312223141423  
41331

### just kiddin boss

2344324143221234341233233414212341324343331

[The questions are on the next page.]



**Questions:**

**7.1** (10 marks)

What are the codes for each of the lowercase letters?

**7.2** (5 marks)

What message does the following sequence of button presses encode?

23121232232321414313142343234132233343123241432221424142341331

**7.3** (5 marks)

With what sequences of button presses would you input the following messages?

a. help

b. Mayday mayday SOS



## Answer sheet

7.1	a	b	c	d	e	f	g	h	i
	j	k	l	m	n	o	p	q	r
	s	t	u	v	w	x	y	z	
7.2									
7.3a									
b									



## Answers

7.1	a	b	c	d	e	f	g	h	i
	<b>31</b>	<b>2341</b>	<b>242</b>	<b>233</b>	<b>21</b>	<b>244</b>	<b>341</b>	<b>231</b>	<b>41</b>
	j	k	l	m	n	o	p	q	r
	<b>23443</b>	<b>2343</b>	<b>232</b>	<b>243</b>	<b>42</b>	<b>32</b>	<b>342</b>	<b>23442</b>	<b>[44]</b>
	s	t	u	v	w	x	y	z	
	<b>43</b>	<b>22</b>	<b>241</b>	<b>2342</b>	<b>344</b>	<b>[23441]</b>	<b>343</b>	<b>23444</b>	
7.2	<b>hello is anybody listening</b>								
7.3a	<b>23121232342331</b>								
b	<b>332433134323331343124331343233313431334333323343331</b>								