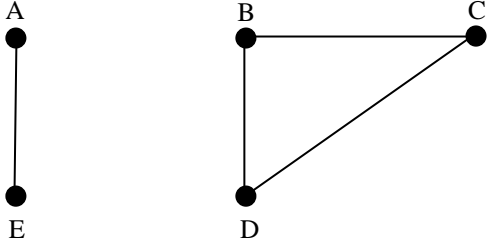


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1.

<p>(i)</p> 	<p>M1 A1</p>	<p>M1 any and only 3 of the 4 A1 all</p>
<p>(ii) 6</p>	<p>M1 attempt at complete connectivity A1</p>	<p>M1 5, 6 or 7 A1 6</p>
<p>(iii) e.g. 4 arcs and (e.g.) {A}, {B, C, D, E}</p>	<p>B1 B1 B1</p>	<p>4 ... set of 1 ... disjoint set of 4</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>SC M1 6 arcs A1 appropriate sets ... disjoint of size 2 and 3</p> </div>
<p>(iv) Reference to parts (i) and (ii), in reverse – or similar</p>	<p>B1</p>	

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2.

(i)	Test number	Sample drawn from flagons numbered	Result (D = dead, A = alive)	B1 B1 B1 B1	cao cao ... allow extra second line of 5678 D, but with -1 cao cao
	1	1, 2, 3, 4	A		
	2	5, 6	A		
	3	7	D		
	4	8	A		
(ii)	Test number	Sample drawn from flagons numbered	Result (D = dead, A = alive)	B1 B1 B1 1,2 3 4 B1 5,6 7 8	cao cao award the last two B1s only for contiguous blocks of 3 tests  from line 3 allow extraneous lines but -1 once only, and only from the last two B1s
	1	1, 2, 3, 4	D		
	2	5, 6, 7, 8	D		
	3	1, 2	A		
	4	3	D		
	5	4	A		
	6	5, 6	A		
	7	7	D		
	8	8	A		



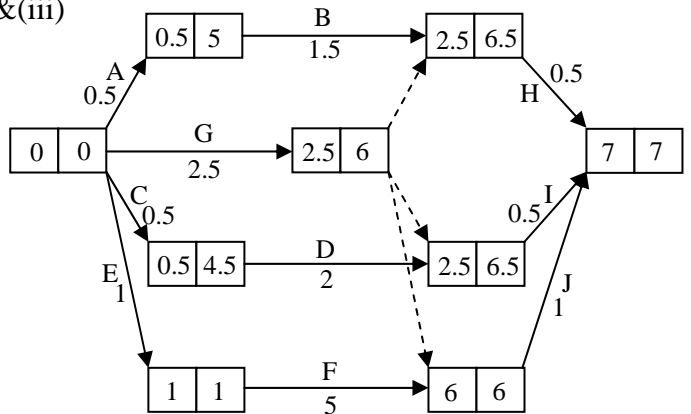
4.

(i)

Task	Description	Duration (mins)	Immediate predecessor(s)
A	Fill kettle and switch on	0.5	—
B	Boil kettle	1.5	A
C	Cut bread and put in toaster	0.5	—
D	Toast bread	2	C
E	Put eggs in pan of water and light gas	1	—
F	Boil eggs	5	E
G	Put tablecloth, cutlery and crockery on table	2.5	—
H	Make tea and put on table	0.5	B; G
I	Collect toast and put on table	0.5	D; G
J	Put eggs in cups and put on table	1	F; G

B1 A, C, E and G  
 B1 B, D and F  
 B1 H, I and J

(ii)&(iii)



M1 activity-on-arc  
 A1 A, G, C, E,  
 B, D, F  
 A1 H, I, J  
 M1 A1 forward pass  
 M1 A1 backward pass

no follow through  
 no multiple starts  
 no multiple ends  
 ✓ but no follow of activity-on-node  
 ✓ ditto

(iv) critical activities: E; F; J  
 duration: 7 minutes

task: A B C D E F G H I J  
 float: 4.5 4.5 4 4 0 0 3.5 4 4 0

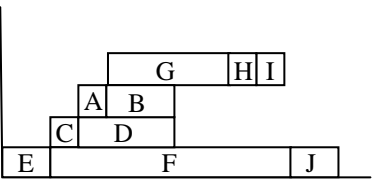
B1  
 B1  
 B1

cao  
 cao  
 cao blank=0

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<p>(v) e.g.</p> 	<p>M1 cascade or condensed cascade</p> <p>A1 activities other than B, D and F non-overlapping</p> <p>A1 correctly finish in 7</p>	<p>need to have 9 or 10 activities</p> <p>E C A G H I J</p> <p>cao</p>
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5.

<p>(i) e.g. 00–04 6 05–29 7 30–79 8 80–99 9</p>	<p>M1 rule using 2-digit nos A1 correct proportions A1 efficient</p>	
<p>(ii) e.g. 00–09 goal 10–99 no goal</p>	<p>B1</p>	<p>complete rule required</p>
<p>(iii) e.g. 8 0 1 0 0 0 0 0 0 so 1 goal</p>	<p>B1 B1 B1</p>	<p>√ rule (i) √ need to see which are converted ... their 8 and rule (ii) √ their 8 and rule (ii) ... ignore previous line</p>
<p>(iv) e.g. 00–31 5 32–63 6 64–79 7 80–95 8 96–99 reject and redraw</p>	<p>M1 2 or more rejected A1 correct proportions A1 efficient</p>	<p>allow part (iv) if seen elsewhere  3 or 4 rejected</p>
<p>(v) e.g. 6 0 0 1 0 0 0 so 1 goal</p>	<p>B1 M1 A1</p>	<p>in part (v) below expect either 00–11 or 88–99 for goal any other rule must be declared to score marks √ rule (iv) √ their 6 ... need to see which are converted √</p>
<p>(vi) Each scored 10 goals. Nothing to choose between them.</p>	<p>M1 A1</p>	<p>goals scored one, the other or indifferent, depending on goals scored</p>
<p>(vii) More repetitions</p>	<p>B1</p>	<p>“greater number of random numbers” → 0 “more accurate data” → 0 Also no “or”s! 3-digit RNs → 0</p>

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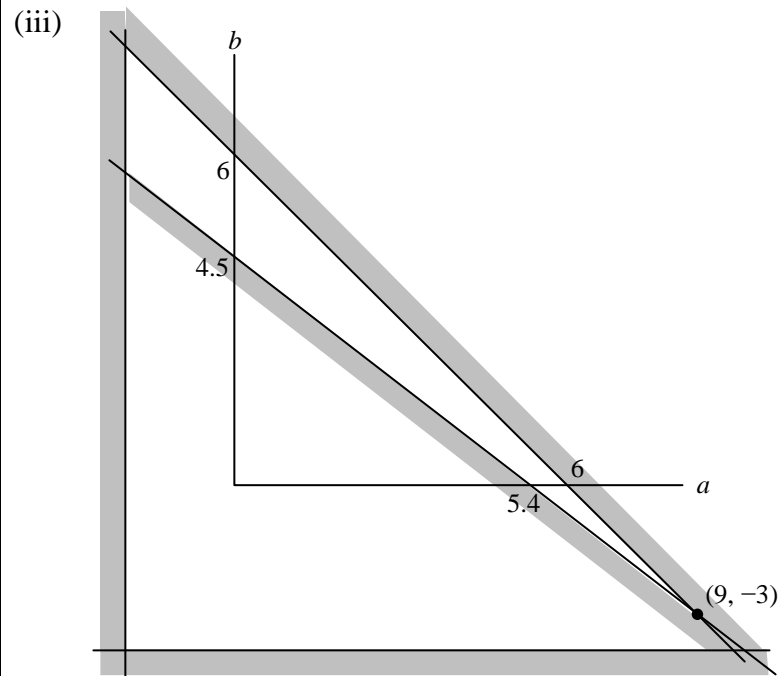
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6.

- (i) Thousands of litres of A in stock = 2  
 $b \geq -4$

- (ii)  $5(a+2) + 6(b+4) \geq 61$   
 $(a+2) + (b+4) \leq 12$  giving  $a + b \leq 6$



- (iv) Increase stock levels of A by 9000 litres.  
 Reduce stock levels of B by 3000.

- (v) New stock levels are 11000 of A and 1000 of B.  
 $5 \times 11000 + 6 \times 1000 = 61000$   
 $11000 + 1000 = 12000$

B1  
 B1

M1 A1  
 M1 A1

B4 lines  
 B1 shading

B1  
 B1

B1  
 B1  
 B1

cao

watch for fluke

✓ their negative gradient stock line

✓ shape =  or 

Give the marks for 9000, -3000, or equivalent  
 $\pm 200$  litres on both

✓ (iv) SC correct answer from nowhere OK

Allow comment only for the “fully stocked” B1.