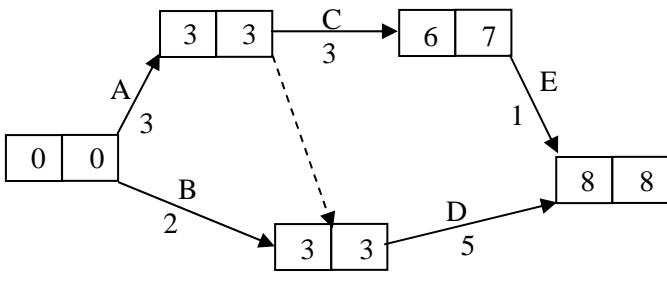
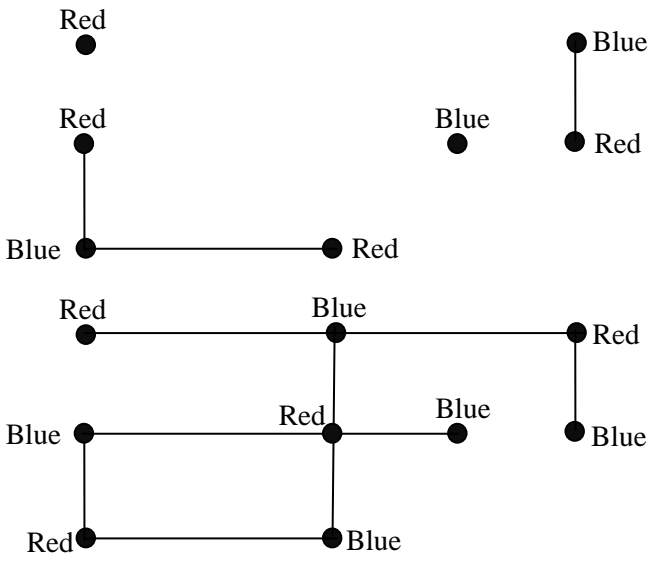


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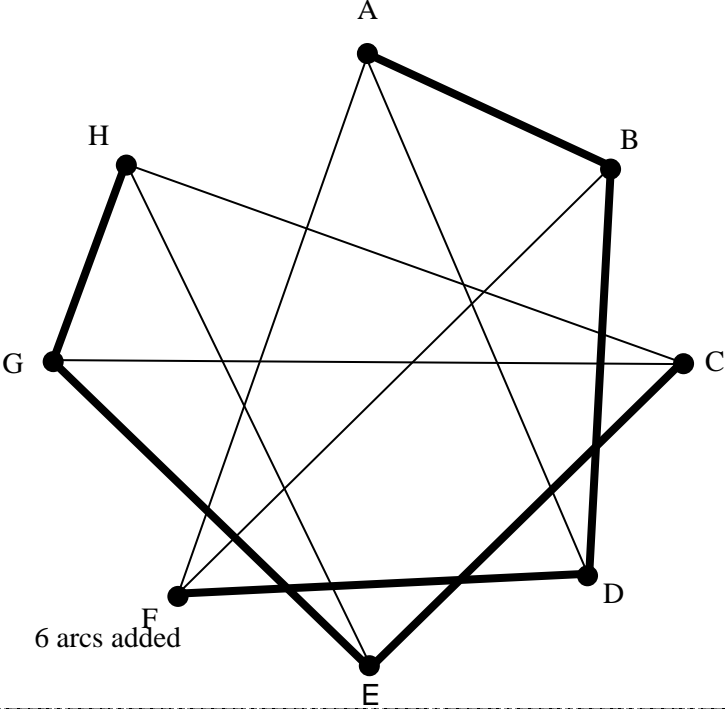
Mark Scheme

# 4771 Decision Mathematics 1

<p>1</p>	<p>(i) &amp; (ii)</p>	 <p>Critical activities: A and D</p>	<p>M1 activity-on-arc A1 C and E OK A1 D OK  M1 forward pass A1  M1 backward pass A1  B1</p>
<p>2</p>	<p>(i)</p>	 <p>Subgraph</p> <p>Swap colours on connected vertices and complete</p>	<p>M1 subgraph A1  M1 Changing colours A1 top right A1 bottom left A1 not singletons  B1</p>
<p></p>	<p>(ii)</p>	<p>The rule does not specify a well-defined and terminating set of actions.</p>	<p>B1</p>

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Mark Scheme

3	(i)	No repeated arcs. No loops	B1 B1
	(ii)	Two disconnected sets, {A,B,D,F} and {C,E,G,H}	M1 A1
	(iii)		M1 A1  B1
	(iv)	$4 \times 4 = 16$ or $\binom{8}{2} - 12 = 28 - 12 = 16$	B1

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Mark Scheme

<p>4</p>	<p>(i)</p>	<p>e.g.                  Let <math>x</math> be the number of adult seats sold.                  Let <math>y</math> be the number of child seats sold.  <math>x + y \leq 120</math>  <math>x + y \geq 100</math>  <math>x \geq y</math></p>	<p>M1                  A1                  B1                  B1                  B1</p>
		<p>(ii)</p>	<p>B3 lines                  (scale must be clear)                  B1 shading                  (axes must be clear)</p> <p>B1 point + amount</p> <p>M1 point                  A1 amount</p> <p>M1 point                  A1 amount</p>
<p>(vi)</p>		<p><math>6000 + 60c &gt; 10000 \Rightarrow c \geq 67</math></p>	<p>M1 A1</p>

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Mark Scheme

<p>5</p>	<p>(i) &amp; (ii)</p>	<p>shortest route: A E C F distance: 26 miles</p>	<p>M1 network A1 arcs A1 lengths  M1 Dijkstra A1 working values B1 order of labelling labels  B1 B1</p>
	<p>(iii)</p>	<p>CE CD AE CF <del>AD BF AB EF</del></p> <p>total length of connector = 45</p>	<p>M1 5 arc connector A1 AD not included A1 all OK, inc order  B1  B1</p>
	<p>(iv)</p>	<p>A 3 miles (or length = 9) B 2 miles (or length = 10)</p>	<p>B1 B1</p>

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## Mark Scheme

6	(i)	e.g. 0, 1, 2 → fall 3, 4, 5, 6, 7, 8 → not fall 9 → redraw	M1 ignore at least 1 A1 proportions A1 correct A1 efficient																																				
	(ii)	<table border="0"> <tr> <td>apple</td> <td>r n</td> <td>fall?</td> </tr> <tr> <td>1</td> <td>1</td> <td>yes</td> </tr> <tr> <td>2</td> <td>3</td> <td>no</td> </tr> <tr> <td>3</td> <td>8</td> <td>no</td> </tr> <tr> <td>4</td> <td>0</td> <td>yes</td> </tr> <tr> <td>5</td> <td>2</td> <td>yes</td> </tr> <tr> <td>6</td> <td>7</td> <td>no</td> </tr> </table> Three apples fall in this simulation.	apple	r n	fall?	1	1	yes	2	3	no	3	8	no	4	0	yes	5	2	yes	6	7	no	M1 A2 -1 each error  B1√															
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	(v)	more simulations	B1																																				