Question 4 (7 marks)

An electronic circuit will remain stable when and , the resistances in ohms of two variable resistors in the circuit, satisfy

(a) When is increasing at a rate of ohms per second, determine the rate that must be changing for the circuit to remain stable when ohms. (4 marks)

(b) The circuit is stable, the resistance of is decreasing at ohms per second and has just reached ohms. Use the technique of increments to calculate the approximate change in the resistance of in the next quarter of a second. (3 marks)

Question 4 (7 marks)

An electronic circuit will remain stable when and , the resistances in ohms of two variable resistors in the circuit, satisfy

(a) When is increasing at a rate of ohms per second, determine the rate that must be changing for the circuit to remain stable when ohms. (4 marks)

|  |
| --- |
| Solution |
| Require given , so implicitly differentiate wrt :  Hence must decrease at ohms per second for stability. |
| Specific behaviours |
| ✓ implicitly differentiates equation  ü obtains expression for required rate  ü indicates all required values for rate  ü correctly calculates rate |

(b) The circuit is stable, the resistance of is decreasing at ohms per second and has just reached ohms. Use the technique of increments to calculate the approximate change in the resistance of in the next quarter of a second. (3 marks)

|  |
| --- |
| Solution |
| Resistance of will increase by ohms. |
| Specific behaviours |
| ✓ states correct values for and  ü forms correct expression for  ü correct value for |