**Question 1**

**Product rule**

v

a)

, where

b)

Critical point

Only defined for where

The local extreme point is

c)

**Quotient rule**

Concavity

or

. Therefore, no inflection point exists for the function

The function is positive where or . Therefore, it is concave up where or

**Question 2**

Let be the length of the poster

Let be the width of the poster

Therefore, the area of the poster is defined by:

Product Rule

**Quotient Rule**

Critical point

Concavity

or

Therefore is the absolute minimum

Therefore, the length of the poster is

Therefore, the width of the poster is

**Question 3**

a)

**L'Hôpital's Rule**

*chain rule*

*chain rule*

b)

**L'Hôpital's Rule**

c)

**L'Hôpital's Rule**

*product rule*

**L'Hôpital's Rule**

d)

*product rule*

**L'Hôpital's Rule**

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**Question 4**

Reference Triangle:

*Pythagoras theorem*

Unit Circle:

The function , is only defined in the first and fourth quadrants.

If

Then and is

Then

Therefore