2.3 Product and Quotient Rules and Higher Order Derivatives

**Product Rule:**

**Extending the Product Rule:**

**Examples: Product Rule**

Find the derivative of

Find the derivative of

Find the derivative of

**Quotient Rule:**

**Examples: Quotient Rule**

Find the derivative of

Find the equation of the tangent line to the graph of at .

Find if

**Proof:**

**Derivatives of Trigonometric Functions**

**Examples: Derivatives of Trigonometric Functions**

Find the derivative of each function

Differentiate both forms of the trigonometric expression and show that the two derivatives are equal.

**Higher Order Derivatives**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **First Derivative** |  |  |  |  |  |
| **Second Derivative** |  |  |  |  |  |
| **Third Derivative** |  |  |  |  |  |
| **Fourth Derivative** |  |  |  |  |  |
| **Nth Derivative** |  |  |  |  |  |

**Position Function:**

**Velocity Function:**

**Acceleration Function:**

**Examples: Acceleration Due to Gravity**

The position function of an object dropped on Mars is , where is the height in meters and is the time in seconds after the object is dropped. What is the ratio of the Earth’s gravitational force to Mars?

**Finding the value of a derivative on the calculator:**