Problems for Gateway #4: The Product Rule

1.   Find the derivative of: $f(x) = x^2 \cdot e^x$.

2.   Find the derivative of: $g(t) = t^7 \cdot \ln(t)$.

3.   Find the derivative of: $m(x) = x \cdot \ln(x)$.

4.   Find the derivative of: $p(t) = \ln(t) \cdot 2^t$.

5.   Find the derivative of: $q(x) = x^3 \cdot 3^x$.

6.   Find the derivative of: $n(x) = \ln(x) \cdot (2 + x)$.

7.   Find the derivative of: $f(x) = 2^x \cdot x$.

8.   Find the derivative of: $p(t) = t^2 \cdot 2^t$.

9.   Find the derivative of: $g(x) = e^x \cdot x^4$.

10.   Find the derivative of: $u(z) = \ln(z) \cdot e^z$.

ANSWERS:

1. $f'(x) = 2x \cdot e^x + x^2 \cdot e^x$.

2. $g'(t) = 7t^6 \cdot \ln(t) + t^6$.

3. $m'(x) = \ln(x) + 1$.

4. $p'(t) = (1/t) \cdot 2^t + \ln(t) \cdot \ln(2) \cdot 2^t$.

5. $q'(x) = 3x^2 \cdot 3^x + x^3 \cdot \ln(3) \cdot 3^x$.

6. $n'(x) = (1/x) \cdot (2 + x) + \ln(x)$.

7. $f'(x) = \ln(2) \cdot 2^x \cdot x + 2^x$.

8. $p'(t) = 2t \cdot 2^t + t^2 \cdot 2^t \cdot \ln(2)$.

9. $g'(x) = e^x \cdot x^4 + e^x \cdot 4x^3$.

10. $u'(z) = (1/z) \cdot e^z + \ln(z) \cdot e^z$.