WORKSHEET: PRODUCT AND QUOTIENT RULES

Names and student IDs: _____

Recall the quotient rule: if f and g are differentiable, $g(x)$ is never zero (on a suitable open interval) and

$$j(x) = \frac{f(x)}{g(x)}$$

for all x (in a suitable open interval), then

$$j'(x) = \frac{f'(x)g(x) - f(x)g'(x)}{[g(x)]^2}.$$

1. Differentiate the function $j(x) = \dfrac{\sin(x)}{x^2 + x + 78}$.

2. Differentiate the function $q(x) = \dfrac{x^3 \sin(x)}{x^2 + x + 78}$. You will need both the product and quotient rules. To decide which one to use first, look at which operation is done **last** when evaluating, say, $q(2)$.

3. Differentiate the function $f(x) = \dfrac{2}{x^3}$. Do **not** use the quotient rule!

4. Differentiate the function $g(x) = \sqrt[3]{x}$.

5. Differentiate the function $h(x) = \dfrac{1}{\sqrt[3]{x}}$. Do **not** use the quotient rule!

Date: 14 April 2025.