

IB Math 2: Exit Slip (Derivatives using power rule/chain rule/product rule/quotient rule):

Name: Key Period: _____

Find the derivatives of the following functions.

1. $f(x) = (2-3x)^2 + 2x\sqrt{x} = (2-3x)^2 + 2x^{\frac{3}{2}}$

$f'(x) = -6(2-3x) + 3x^{\frac{1}{2}}$

OR $\Rightarrow f'(x) = -12 + 18x + 3\sqrt{x}$

2. $f(x) = \frac{x^3 - \sqrt{x}}{x} = x^2 - x^{-\frac{1}{2}}$

$f'(x) = 2x + \frac{1}{2}x^{-\frac{3}{2}}$

OR $f'(x) = 2x + \frac{1}{2x\sqrt{x}}$

3. $f(x) = \sqrt[3]{x}(5x^2 - 2)^3 = x^{\frac{1}{3}}(5x^2 - 2)^3$

$f'(x) = \frac{1}{3}x^{-\frac{2}{3}}(5x^2 - 2)^3 + (x^{\frac{1}{3}})(3)(10x)(5x^2 - 2)^2$

$= \left[\frac{1}{3}x^{-\frac{2}{3}}(5x^2 - 2)^3 + 30x^{\frac{4}{3}}(5x^2 - 2)^2 \right]$

OR $f'(x) = \frac{(5x^2 - 2)^3}{3x^{2/3}} + 30x^{4/3}(5x^2 - 2)^2$

4. $f(x) = \frac{x^3}{5x^2 - 8}$

$f'(x) = \frac{3x^2(5x^2 - 8) - (10x)x^3}{(5x^2 - 8)^2}$

$= \frac{15x^4 - 24x^2 - 10x^4}{(5x^2 - 8)^2}$

$= \frac{5x^4 - 24x^2}{(5x^2 - 8)^2}$

5. $f(x) = \left(\frac{x-6}{x+7}\right)^3$

$f'(x) = 3 \left(\frac{x-6}{x+7}\right)^2 \left[\frac{(x+7) - (x-6)}{(x+7)^2} \right]$

$= \frac{39(x-6)^2}{(x+7)^4}$

6. Find the gradient of the tangent to the curve of $f(x) = \frac{5x^3}{(2x+1)^2}$ at $x=1$

$f'(x) = \frac{15x^2(2x+1)^2 - (5x^3)(4)(2x+1)}{(2x+1)^4}$

$f'(1) = \frac{15(3)^2 - (5)(4)(3)}{3^4} = \frac{25}{27}$