Name:_________________________________ Band:________

Calculus | Packer Collegiate Institute

Basic Derivatives: Multiple Methods

For many "find the derivative" problems you can solve them in multiple ways, but for some "find the derivative" problems, you can only solve them in one way.

Example 1: If you have $f(x)=\dfrac{2x^2+\sqrt{x}}{\sqrt{x}}$, you can take the derivative in **two** ways.

1) You can use the quotient rule, and then do a lot of simplification
2) You can rewrite $f(x)$ by breaking it into two fractions, and then apply the power rule to each of the two terms

Which of these ways seems easier to you? Why?

Example 2: If you have $f(x)=\dfrac{x^3+2x+1}{x+1}$, you can only take the derivative in **two** ways.

1) You can use the quotient rule, and then do a lot of simplification
2) You can break the fraction into three fractions, and then use the quotient rule on each of the three terms.

Which way seems easier (circle one)?: Option 1 or Option 2

Example 3: If you have $f(x)=x^6e^x$, you can only take the derivative in **one** way.

1) You must use the product rule

Example 4: If you have $f(x)=e^x(x+1)$, you can take the derivative in **two** ways.

1) You can use the product rule directly
2) You can distribute so $f(x)=xe^x+e^x$, and then apply the product rule to the first tem, and take the derivative of the second term.

Which way seems easier (circle one)?: Option 1 or Option 2

Part I: For the following, think about what options are available and write down **in words** (like we did for the example above) **all available options.** Then put an * next to the option that you think is the easiest to apply.

a) $y = x^3 + \pi^2$

b) $y = \sqrt{2}(x-1) + \sqrt{x}$

c) $y = \dfrac{5x^2 + 2x - 1}{x^3}$

d) $y = (2x^3 + 1)(x^2 - x)$

e) $y = \dfrac{x + 2x^{3/2}}{\sqrt{x}}$

f) $y = \left(\dfrac{2x+2}{x}\right)(x^{-3} + 1)$

g) $y = \dfrac{x^2 - 1}{x^4 + 1}$

h) $y = \left(\dfrac{1}{x} + \dfrac{1}{x^2}\right)(3x^3 + 27)$

i) $y = e^{x-4} + x^2$

j) $y = e^x(x^2 + 5x - 2)$

k) $y = \dfrac{x-2}{e^x}$

l) $y = e^{2x}$

Part II: Find the following derivatives

a) $y = x^3 + \pi^2$

b) $y = \sqrt{2}(x-1) + \sqrt{x}$

c) $y = \dfrac{5x^2 + 2x - 1}{x^3}$

d) $y = (2x^3 + 1)(x^2 - x)$

e) $y = \dfrac{x + 2x^{3/2}}{\sqrt{x}}$

f) $y = \left(\dfrac{2x+2}{x}\right)(x^{-3} + 1)$

g) $y = \frac{x^2 - 1}{x^4 + 1}$

h) $y = \left(\frac{1}{x} + \frac{1}{x^2}\right)(3x^3 + 27)$

i) $y = e^{x-4} + x^2$

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