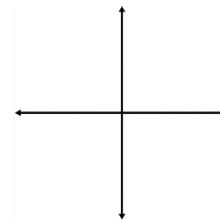


## AP Calculus – 2.3 Notes – Derivatives of Polynomials (Power Rule)

1. Constant Rule: If  $f(x) = c$ , then  $f'(x) = 0$

Example:  $f(x) = 5$



2. Power Rule: If  $f(x) = x^n$ , then  $f'(x) = n * x^{n-1}$

Steps a) Bring Exponent down as coefficient in front of the variable

b) Subtract 1 from the original exponent value

### **Power Rule Conditions:**

*i*) Convert radicals to rational exponents (ex:  $\sqrt{x^5} = x^{\frac{5}{2}}$ )

*ii*) Bring variable to the numerator before applying power rule

*iii*) Expand terms: resolve parentheses & fractional terms before applying Power Rule

*\*Important Note:* Be sure the function is in the appropriate form (all conditions met!) before applying Power Rule

Example 1: Find Derivatives of the following:

a)  $y = x^7$

b)  $g(x) = \sqrt[3]{x}$

c)  $y = \frac{4}{x^5}$

d)  $y = 8x^{2/3} - \sqrt[5]{x} + \frac{2}{3\sqrt{x}} + 0.875$

Example 2: If  $f(x) = \frac{1}{x^2}$  find  $f'(2)$

Example 3: If  $f(x) = \sqrt[3]{x^2}$ , write the tangent line equation to  $f(x)$  at  $x = 1$

Example 4: Find  $f'(x)$  if  $f(x) = \frac{x^4 - 3x^2 + 4(\sqrt[3]{x})}{2\sqrt{x}}$

Example 5: Find  $f'(x)$  if  $f(x) = 3x(x + 1)^2$