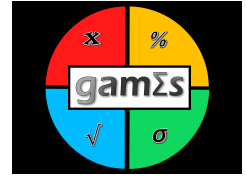


GAMES Practice Problems – Derivative Computations



1. Differentiate the following functions:

(a) $\frac{x+1}{x^5}$

(b) $\frac{3x-1}{x^2+x+1}$

2. Considering an oil well that extracts barrels of oil per day of $q(t)$ and the pricing in dollars per barrel is $p(t)$ at time t . Assume that both q and p are increasing functions of time, t .

(a) Find an expression for the rate of change in revenue, $R'(t)$.

(b) Explain the economic meaning of your expression. Is revenue increasing over time?

3. Differentiate the following functions using the chain rule:

(a) $y = (x^3 + x^2)^{50}$

(b) $y = \left(\frac{x-1}{x+3}\right)^{1/3}$

(c) $y = \sqrt{x^2 + 1}$

4. Find the derivative of y with respect to x : $y = 5(1 + \sqrt{x^3 + 1})^{25}$

5. Compute the following derivative using the chain rule

(a) $y = 5u^4$ when $u = 1 + x^2$

(b) $y = u - u^6$ when $u = 1 + 1/x$

6. Consider a demand function from economics: $q = b - \sqrt{ap - c}$ where p is price, q is quantity demanded. a, c, b are constant. Find $\frac{dq}{dp}$.

7. Consider general forms of composite functions, z, w, k . Find $v'(x)$.

(a) $v(x) = z(x^2)$

(b) $v(x) = k(x^n w(x)) =$

8. A truck can travel $s(t)$ kilometers in t hours. To travel s kilometers, the truck uses $B(s)$ litres of gas. Provide interpretation of the function $b(t) = B(s(t))$ and find a formula for b' .

9. Find the second derivative of:

(a) $y = x^5 - 3x^4 + 2$

(b) $y = \sqrt{x}$

(c) $y = (1 + x^2)^{10}$

