

9.4

1/3

## Derivative Formulas

Find  $\frac{d}{dx}$  of  $1, x, x^2, x^3, \dots, x^n$

Power Rule: If  $f(x) = x^n$ , where  $n$  is a real number, then  $f'(x) = n x^{n-1}$ .

Ex1: Find the derivative of

a)  $f(x) = x^4$

b)  $y = x^{-4}$

c)  $g(x) = x^{2/3}$

d)  $y = \sqrt{x}$

e)  $h(x) = \frac{1}{\sqrt[3]{x}}$

Ex2: Find the eqn of the tangent line to  $y = x^2$  when  $x=1$ .

constant fct. rule: If  $f(x) = c$ , where  $c$  is a constant, then  $f'(x) = 0$ .

Ex3:  $\frac{d}{dx} \pi = 0$

Derivative Notation

coefficient Rule: If  $f(x) = c \cdot u(x)$  where  $c$  is a constant and  $u(x)$  is a differentiable fct of  $x$ , then  $f'(x) = c \cdot u'(x)$ .

9.4

2/3

Ex 4: a)  $(4x^5)'$

b)  $\frac{d}{dx} 7\sqrt[4]{x}$

c) If  $N = \frac{1}{\sqrt{2/3}}$ , find  $\frac{dN}{dV}$ .

sum & difference rules: If  $f(x) = u(x) \pm v(x)$ ,  
 where  $u, v$  are differentiable fcts of  $x$ ,  
 then  $f'(x) = u'(x) \pm v'(x)$ .

(prove the "minus").

Ex 5: a)  $\frac{d}{dx} (4x^7 - 2x^3)$

b) if  $f(x) = \frac{1}{x} + \sqrt{x}$ , find  $f'$

Ex 6: If the revenue from the sale of  
 $x$  items is modeled by  $R(x) = 300x - 0.02x^2$ ,

a) find  $\overline{MR}$  when  $x=40$ .

b) interpret  $MR(40)$ .

9.4
3/3

Ex 7: If the cost from the sale of

$x$  items is  $C(x) = 40500 + 190x + 0.2x^2$ ,

a) Find the average cost.  $\bar{C}(x) = \frac{C(x)}{x}$

b) Find the instantaneous ROC of the average cost.

c) when does (b) equal zero.

d) find  $MC(x)$  and  $\bar{C}(x)$  at the  $x$  found in (c).