

Business Calculus

Brian E. Veitch

Northern Illinois University

January 19, 2014

1 / 9

Chapter 1 - Differentiation 1.8 - Higher Order Derivatives

Higher Order Notation

2 / 9

Example 1.1

Find the y' and y'' (or $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$)

1 $y = x^3 - 6x^2 + 20x$

2 $y = \frac{2}{x} - \frac{3}{x^2}$

3 $y = \frac{1-x}{1+x}$

4 $y = (x^2 + 3)(4x - 1)$

Example 1.2

For $f(x) = (3x^2 - 4x + 1)^{12}$, find $f''(1)$.

Velocity and Acceleration

Definition 1.3

The **velocity** of an object that is $s(t)$ units from a starting point at time t is given by

$$v(t) =$$

$$a(t) =$$

7 / 9

Example 1.4

If a ball is thrown vertically upward from the surface of the moon with an initial velocity of 10 m/s, its height after t seconds is $s(t) = 10t - 0.83t^2$. Answer the following questions.

- 1 What is the velocity at time $t = 0$, i.e., $v(0) =$
- 2 What is the height at $t = 3$ seconds, 6 seconds, 8 seconds?
- 3 What is the velocity function?
- 4 What is the velocity at $t = 3$ seconds, 6 seconds, 8 seconds?
- 5 What's happening near $t = 6$ seconds?
- 6 What is the acceleration of the ball on the moon as it's falling?

8 / 9

