

Math 1a. §2.6. Tangents, Velocities, and  
Other Rates of Change  
Worksheet

Fall 2005

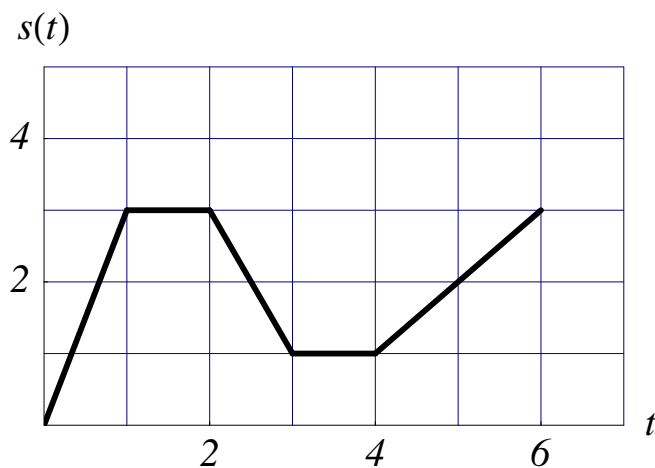
1. Find the equation of the tangent line to the curve  $y = 2x^3 - 5x$  at the point  $(-1, 3)$ .

2. If an arrow is shot upwards on the moon with an initial velocity of 58 m/s, its height in meters after  $t$  seconds is given by

$$H = 58t - 0.83t^2.$$

- (a) Find the velocity of the arrow after one second.
- (b) Find the velocity of the arrow when  $t = a$ .
- (c) When will the arrow hit the moon?
- (d) With what velocity will the arrow hit the moon?

3. A particle starts moving to the right along a horizontal line. The graph of its position function is shown below.



- (a) When is the particle moving to the right? When is it moving to the left? When is it not moving at all?
- (b) Draw the graph of the particle's velocity function.
4. The table below shows the estimated percentage  $P$  of the population of Europe that use cell phones. (Midyear estimates are given.)

Year	1998	1999	2000	2001	2002	2003
$P$	28	39	55	68	77	83

- (a) Find the average rate of cell phone growth
- from 2000 to 2002
  - from 2000 to 2001
  - from 1999 to 2000
- In each case, include the units.
- (b) Estimate the instantaneous rate of growth in 2000 by taking the average of two average rates of change. What are its units?
- (c) Estimate the instantaneous rate of growth in 2000 by measuring the slope of a tangent.