1. Find the slope of the tangent line to the function $f(x) = e^x$ at $x = 0$.

   (a) The tangent line must pass through the point $(0, f(0)) = (0, 0)$.

   (b) To find the slope, we compute the slope of the line through (h, e^h) and $(0, e^0)$. The slope is given by

   $$\frac{e^h - 1}{h}$$

   for h near 0.

   Compute the value of the slope for few small values of h and make a guess as to what happens as h approaches 0.

h	$(e^h - e^0)/h$
1	$1.7183\ldots$
0.1	$1.052\ldots$
-0.05	$-0.975\ldots$
??	

   As h approaches 0, the slope is ____________.

   (c) Now use the point and slope above to write the equation of the line. Remember that the line through (x_0, y_0) with slope m has the equation

   $$y - y_0 = m(x - x_0).$$

   The equation of the line is $y = x + 1$.

2. Find the instantaneous velocity of a particle whose position at time $t = 2$ is $p(t) = -5t^2 + 20t$. Assume that time is measured in seconds and the height p is measured in meters.

   (a) We compute average velocities on intervals $[3, 3 + h]$ for h close to 0.

Interval	$p(3)$	$p(3 + h)$	average velocity
$[3, 4]$	15	0	-15
$[3, 3.1]$	15	13.95	-10.5
$[3, 3 + 0.03]$	15	14.695	-10.15
$[3, 3+??]$			
$[3, 3 + h]$			$-10 - 5h$

   (b) Letting the interval $[3, 3 + h]$ shrink to a point, the average velocity approaches -10.

   (c) The units for the velocity are m/s.