Calculus 1: Projectile Motion Wkst   Name_____Block _____Date _____

1) A projectile is shot upward from the ground with an initial velocity of 320 feet per second.
   a) What is the velocity after 5 seconds?
   b) What is its acceleration after 3 seconds?

$s(t) = -16t^2 + 320t + 0$
$v(t) = -32t + 320$
$a(t) = -32$

a) $v(5) = -32 \cdot 5 + 320$
$= 160 \, ft/sec$

b) $a(3) = -32 \, ft/sec^2$

2) A ball is thrown vertically upward from the ground with an initial velocity of 160 ft/sec.
   a) When will the ball hit the ground? What is the velocity when it hits the ground?
   b) When will the ball reach its maximum height?

$s(t) = -16t^2 + 160t + 0$
$v(t) = -32t + 160$

a) $0 = -16t^2 + 160t$ $v(10) = -32 \cdot 10 + 160$
$16t^2 = 160t = 0$ $= -160 \, ft/sec$
$16t(t - 10) = 0$
$t = 0 \quad t = 10 \, sec$

b) $v(t) = 0$
$-32t + 160 = 0$
$t = 5 \, sec$

3) A projectile is launched upward from a height of 129 ft with a velocity of 87 ft/sec.
   a) When will the projectile hit the ground? What is its impact velocity?
   b) When will the projectile reach its maximum height? What is the maximum height?
   c) What is the total distance traveled by the particle?

$s(t) = -16t^2 + 87t + 129$
$v(t) = -32t + 87$

a) $-16t^2 + 87t + 129 = 0$
$t = 6.65 \, sec$

$v(6.65) = -32 \cdot 6.65 + 87$
$= -125.8 \, ft/sec$

b) $v(t) = 0$
$-32t + 87 = 0$
$t = 2.719 \, sec$
$s(2.719) = 247.266 \, ft$

c)
$s(2) = 129$
$s(t_p) = 247.266$ } 118.266
$s(end) = 0$ } 247.266

365.532 ft

4) If a baseball is thrown vertically upward at a rate of 64ft/sec...
   a) When does the baseball land? What is its velocity when it hits the ground?
   c) What is the velocity of the baseball after two seconds? What is the acceleration?

$s(t) = -16t^2 + 64t + 0$
$v(t) = -32t + 64$
$a(t) = -32$

a) $-16t^2 + 64t = 0$
$-16t(t - 4) = 0$
$t = 0, 4$
$t = 4 \, sec$
$v(4) = -64 \, ft/sec$

c) $v(2) = 0 \, ft/sec$
$a(2) = -32 \, ft/sec^2$