

# Solutions to Quiz 13

MATH 139-01 and -02  
Thursday, October 30, 2003

Be sure to **show your work**. Unsupported answers receive no credit.

1. A ball is dropped from the top of a 100-foot building, and its speeds at various times are given in the table.

$t$ (s)	0	1	2	3	4
$v(t)$ (ft/s)	0	9.8	19.6	29.4	39.2

- (a) Estimate how far the ball fell in this time. Use upper and lower estimates and an average of the two.

**Solution:** Upper:  $9.8(1) + 19.6(1) + 29.4(1) + 39.2(1) = 98$  feet.

Lower:  $0(1) + 9.8(1) + 19.6(1) + 29.4(1) = 58.8$  feet.

Average:  $(98 + 58.8)/2 = 78.4$  feet.

- (b) Can you determine whether the ball hit the ground at or before  $t = 4$ ? Support your answer!

**Solution:** The ball could not have hit the ground since the upper estimate is only 98 feet and the building is 100 feet tall. That is, we know that the ball fell **no more** than 98 feet, and it's probably closer to 78 feet.