

Computer Simulations Using Maple

Motion in One-dimension

Introduction

In this lab we will use Maple to solve motion problems in one dimension.

Lab

1. If you have mastered the following you can skip to Procedure 2.
 - a. basic math and algebra using Maple
 - b. plotting using Maple, including labeling the axis and a title
 - c. integrating using Maple, including explicit and implicit
 - d. differentiating using Maple, including first and second order
 - e.
2. Use Maple to solve the following problem.

Jacqueline (who's that?) throws a ball up over her head with a velocity, v_0 . Assume there is no air resistance, find the equations of motion (this means $x(t)$ and $v(t)$).

If Jackie throws the ball with an initial velocity of 15 m/s how high will it go?

3. Try this one.

Junior (will he ever become a senior?) goes to jump in a raft near the shore. As he lands in the boat it leaves the shore with a velocity v_0 (not to smart Junior). Assume the raft resistance is proportional to the velocity find the motion. Solve this problem analytically and then use Maple.

If his initial velocity is 4 m/s how far from the shore will he go?
4. Paul tries to throw a ball as high as the science building. Assume the air resistance is proportional to the velocity, can he do it? Again solve this problem analytically and then use Maple.
5. Not giving up Paul tries it again, but this time the air resistance is proportional to the velocity squared.
6. Can you do this problem again and find the time it takes for the ball to return and hit Paul on the head. Use just Maple for this one.