MATH6103 Differential & Integral Calculus

Real Life Problems Practice Sheet

1) A projectile is fired from a cannon on flat ground at 25m/s at an angle of (approx.) 0.64^{c}. t seconds after it is fired, the x and y co-ordinates (in m) of its position are given by:

$$x = 20t$$
$$y = 15t - 5t^2$$

a) Find $\dfrac{dx}{dt}$ and $\dfrac{dy}{dt}$.

b) Using (a), find $\dfrac{dy}{dx}$ in terms of t.

c) Find the value(s) of t which make(s) $\dfrac{dy}{dx} = 0$.

d) Find the maximum height which the projectile reaches.

e) Find the values of t for which $y = 0$.

f) How far away from the cannon does the projectile land (if it doesn't bounce)?

2) The same cannon is fired but this time into a wind. This time the co-ordinates at time t are given by:

$$x = 20t - \frac{1}{2}t^2$$
$$y = 15t - 5t^2$$

a) Find the maximum height which the projectile reaches.

b) How far away from the cannon does the projectile land (if it doesn't bounce)?