

2280 - 2
 Friday January 26
 Computation sheet
 Example 2, section 2.3

```

> y:= t-> -245*t + 294*25*(1 - exp(-.04*t));
#height y(t)
y := t → -245 t + 7350 - 7350 e(-04 t)
> v:= t -> 294*exp(-.04*t) - 245;
#velocity v(t)
v := t → 294 e(-04 t) - 245
> 25*ln(294.0/245);
#by hand we can set v(t)=0 and solve for t:
4.558038920
> solve(v(t)=0,t);
#or we can ask Maple to do it:
4.558038920
> y(4.558038920);
#max height
108.280465
> solve(y(t)=0,t);
#find when returns to ground
9.410949931, 0.
> 9.410949931 - 4.558038920;
#time descending
4.852911011
> v(9.410949931);
#speed when it lands
-43.2273093

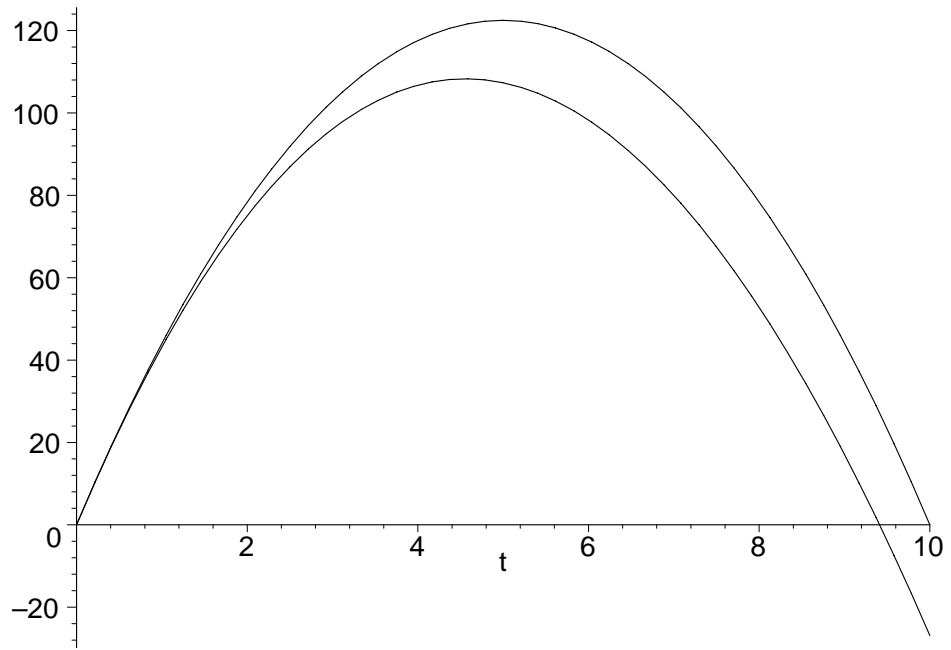
```

Conclusions: bolt rises for 4.56 seconds, to a height of 108.3 meters. Then it spends 4.85 seconds descending, landing with a velocity of -43.3 meters per second. We can see these facts graphically if we plot:

```

> with(plots):
Warning, the name changecoords has been redefined
> z:= t->-4.9*t^2 + 49*t;
#the no drag solution
z := t → -4.9 t2 + 49 t
> plot({z(t),y(t)}, t = 0..10, color=black);

```



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