1. a) $f'(x)=6x^2-18x+12$

$f'(x)=0$

$6x^2-18x+12=0$

$x=1$ or $x=2$ – critical points

$f''(x)=12x-18$

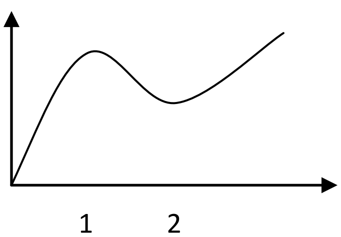
$f''(1)=-6$, so $x=1$ is a point of local maximum

$f''(2)=6$, so $x=2$ is a point of local minimum

b) $f(1)=2-9+12=5$ – global maximum

$f(0)=0$ – global minimum (the interval in this part of the problem should be $0<x<3$, then the answer would be $x=0$ is the point global minimum and $x=3$ is the point of global maximum)

c)



2. $(b^*+1)\exp(-b^*)-b^*=0$

$f(x)=(x+1)\exp(-x)-x$

$f(0)=1>0$

$f(1)=2/e-1<0$

so, since f(x) is continuous, by the intermediate value theorem f(x) has a zero on the interval (0,1), which is equivalent to the existence of the equilibrium (fixed point)

3. a)average rate=1 cm per hour

b) At some time during these 24 hours the rate of growth was exactly 1cm per hour

c) Height of the plant, as a function of time, has assumed every value between 2cm and 26 cm during these 24 hours

4. Need to maximize $A(x)=x*(L-x)$

Same as in class.

5. $e^{-3}/2$

b) 0

c) -4/3

d) ∞

e) 1

6. a) $f_0=3x^2$; $f_\infty=3$

b) $f_0=1/(1+\exp(-x))$; $f_\infty=e^{-x}$

7. Equation of the interpolation lines:

m1=1.1; m2=-0.6

b1=0.9; b2=4.3

g(1.2)=m1*1.2+b1=2.22]

g(2.8)=m2*2.8+b2=2.62

8. $f(1)+f'(1)(a-1)+f''(1)(a-1)^2/2=e+e(a-1)+e(a-1)^2/2=e(1+a-1+a^2-2a+1)=e(a^2-a+1)$

$e^{1.2}\approx e(1.2^2-1.2+1)=3.37$