Problem Set #10

Due: Thursday, 17 November 2011

1. Evaluate the following limits.

(a) $\lim_{t\to 1}\left(\dfrac{1}{\ln(t)}-\dfrac{1}{t-1}\right)$

(b) $\lim_{x\to\infty}\left(1+\dfrac{1}{x}\right)^{x}$

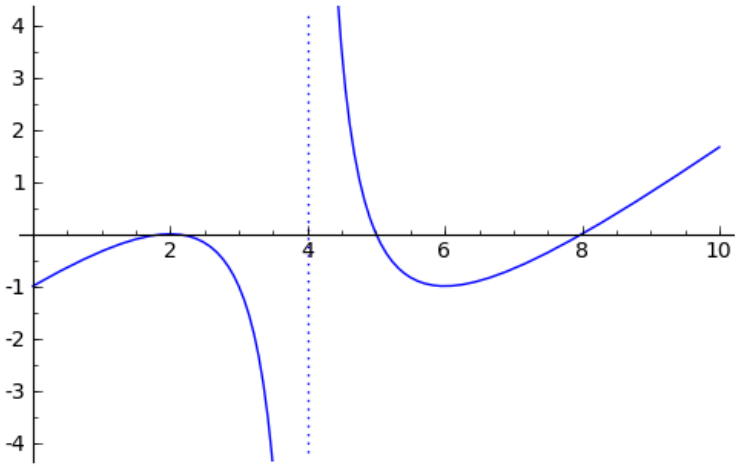
2. Consider the surge function $y = axe^{-bx}$ for positive constants a and b.

(a) Find the local maxima, local minima and, inflection points.

(b) How does varying a and b affect the shape of the graph?

(c) On one set of axes, sketch the graph this function for a few values of a and b.

3. Let f be a function which is continuous on $[0,4)\cup(4,10]$, but undefined at $x = 4$. Below is the graph of the **derivative** of the function f.



(a) On what interval(s) is f increasing? Decreasing?

(b) Find the x-coordinates of all local maxima and minima of f.

(c) On what interval(s) is f convex (concave up)? Concave (concave down)?

(d) Find the x-coordinates of all inflection point(s) of f.

(e) Sketch a possible graph for f on the interval $[0,10]$.