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sandipan_dey >

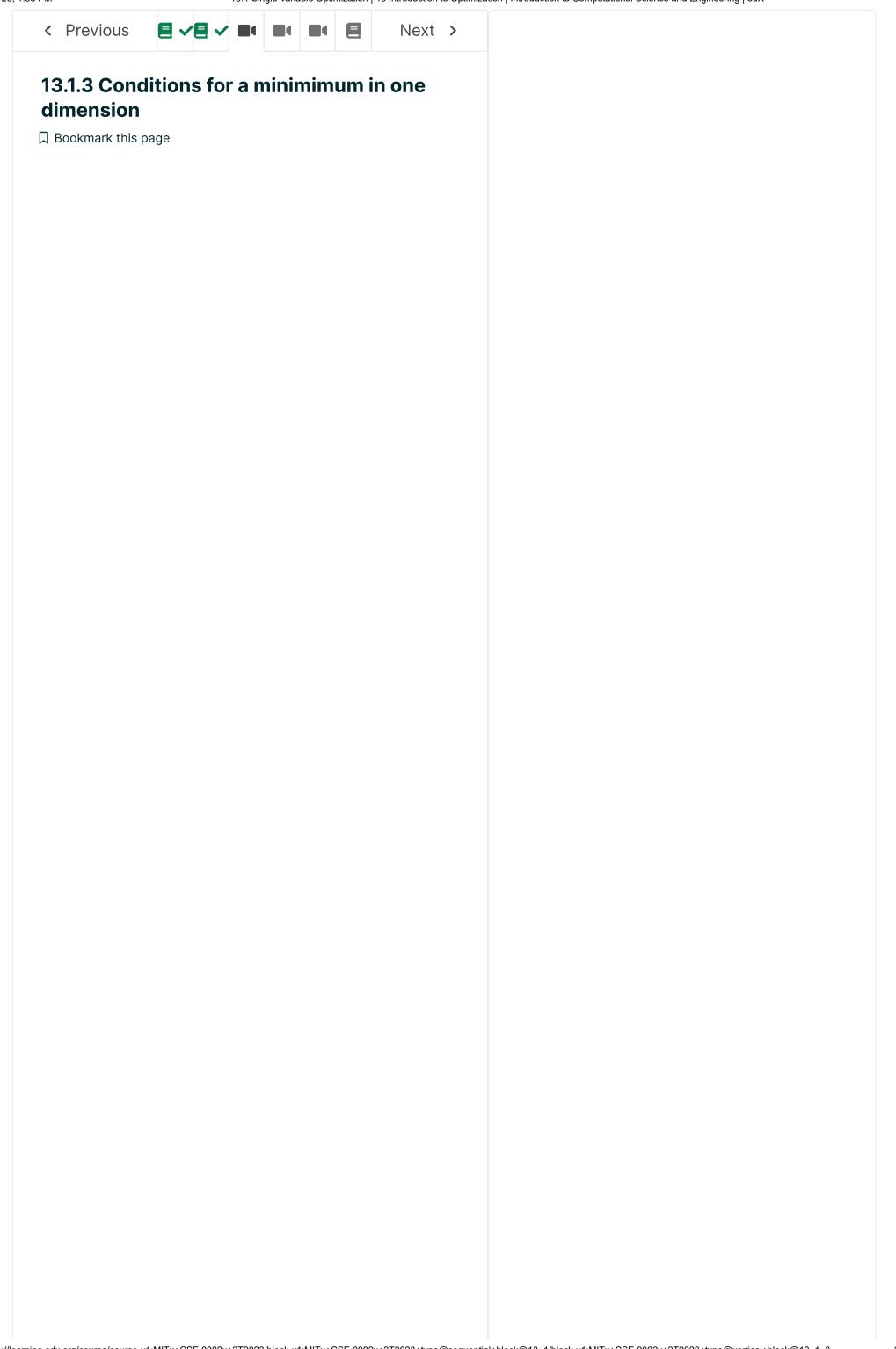
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MO2.11

Now let's consider a more general function, J(a), which we would like to find the minimum value of over some subject of $a \in S$. For example, suppose S is the range of values from $a_{
m left} < a < a_{
m right}.$ The function being minimized $J\left(a\right)$ is known as the objective function. We will assume that the objective function is smooth so that any derivatives of $oldsymbol{J}$ with respect to a that we are interested in will be continuous. Such a function is sketched in Figure <u>13.3</u>.

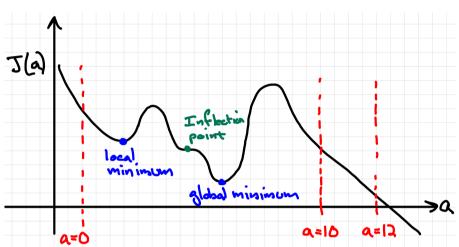


Figure 13.3: Example of $J\left(a
ight)$ showing local and global minimums

Note that while we only will discuss minimization, the same ideas directly apply to maximization of a function, f(a), by simply multiplying the function by -1 such that $J\left(a
ight)=-f\left(a
ight)$. By doing this, then minimizing J(a) is equivalent to maximizing f(a).

We now introduce some fundamental concepts for optimization problems:

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ose that for this function, we are considering $\overline{\mathsf{only}}$ the range 0 < a < 10. Then we see that the

global minimum occurs at approx 6. At this location, $\mathbf{ed}_{\mathbf{A}}^{\mathbf{y}}/\mathrm{d}a=0$ and $\mathrm{d}^{2}J/\mathrm{d}a^{2}\geq0$.

Affiliahere is also what is referred to as a local a ed X minimum eats $a \approx 2$. This local minimum also Opersatisfies the properties the $\mathrm{d}J/\mathrm{d}a=0$ and Cared 2 s $J/\mathrm{d}a^2 \geq 0$. However, its value is not the global Newminimum since a lower value of $m{J}$ is achieved at

 $a \approx 6$.

Legal• An *inflection point*, which occurs at $a \approx 4$, is a Terms of Service & Honor Code derivative changes sign Privacy Policy (and hence at the inflection point the second Accessibility Policy derivative is zero). In general, an inflection point Trademark Policy can have non-zero first derivative, though for the Sitemap situation shown in the figure we have drawn the Cookie Policy inflection point with $J'\left(a
ight)=0$.

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