Title: Is potential energy equation for a mass at infinity correct?

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Abstract: Correct calculation for potential energy for masses at infinity.

Article:

$U = -GMm/r$

The first mass m is supposed to be at infinity that means it exerts some potential energy U to escape from the surface of mass M with radius r and approach infinity , when mass m is at infinity mass M is also should be at infinity with respect to mass m, that to be said , mass m won't reach infinity unless mass M reached infinity as well, the point of calculating potential energy is between two infinities, at these two infinities both masses lies .

The correct way to calculate mass m potential energy is using definite integral again from minus infinity to infinity , from $-\infty$ to ∞ , that is from $-\infty$ to r plus from r to ∞ supposing both masses moved from each other mathematically in that case :

$U = -2GMm/r$ double the actual amount of potential energy because in this case we have two masses each one at infinity with respect to the other. Putting the masses r apart from each other and then one goes to infinity is incorrect mathematically-it actually does not happen, so it is all about mathematics -because in fact distance between them as well as force involve the idea of commutation.

The energy needed for the mass m to escape from mass M should be:

$U = -2GMm/r$

Similar to saying that both of the two masses M and m escape from each other to infinity. In fact we suppose the masses interacts with respect to the observer, but in fact the calculations are with respect to the masses themselves.