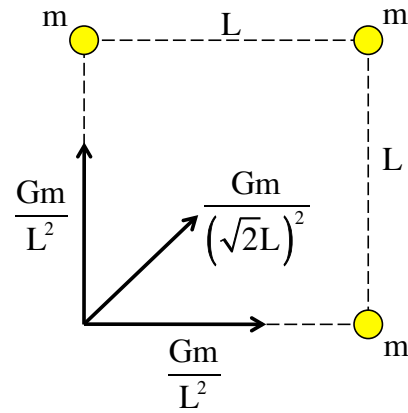


Problem 13.25

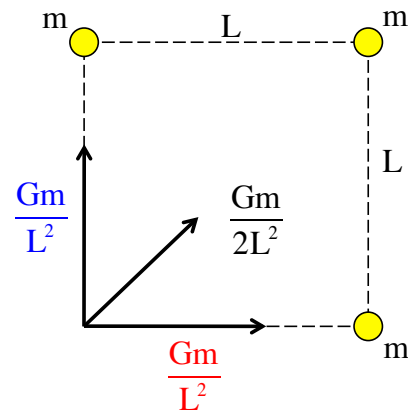
Determine the gravitational field at the empty corner of the square to the right.

The words “gravitational field” are a little misleading as they could denote a *force field*, which would require a mass to register the force, or an *acceleration field* that can exist whether there is a mass at the point of interest to feel the field or not. In this case, as no “effected mass” is included in the problem, I’m assuming they want the *acceleration field*. Sooo . . .



1.)

$$\begin{aligned}
 \vec{a} &= \left(\frac{Gm}{2L^2}\right) \left(\frac{\sqrt{2}}{2} \hat{i} + \frac{\sqrt{2}}{2} \hat{j}\right) + \frac{Gm}{L^2} \hat{i} + \frac{Gm}{L^2} \hat{j} \\
 &= \left(\frac{Gm}{L^2}\right) \left(\left(1 + \frac{\sqrt{2}}{4}\right) \hat{i} + \left(1 + \frac{\sqrt{2}}{4}\right) \hat{j}\right) \\
 &= \left(\frac{Gm}{L^2}\right) \left((1.35) \hat{i} + (1.35) \hat{j}\right) \\
 &= \left(\frac{Gm}{L^2}\right) \left(\left((1.35)^2 + (1.35)^2\right)^{1/2} \angle 45^\circ\right) \\
 &= 1.91 \left(\frac{Gm}{L^2}\right) \angle 45^\circ
 \end{aligned}$$



2.)