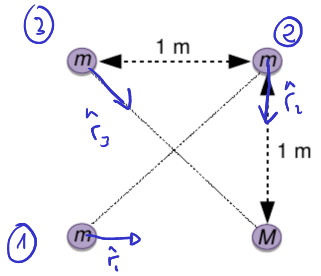
Principio de superposición

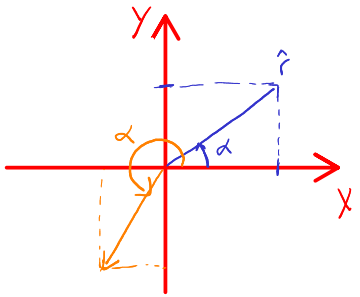
Calcular, en la geometría propuesta, el campo gravitatorio producido por las masas m sobre el punto en el que se encuentra la masa M, así como la fuerza que ésta experimentará.



Formulak

$$\vec{g} = -\frac{Gm}{r^2}\hat{r}$$

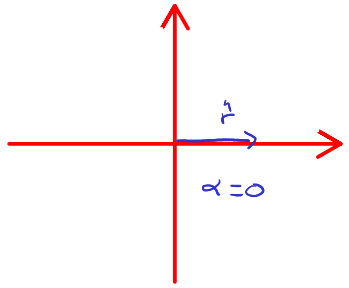
$$\hat{r} = \cos\alpha\,\hat{i} + \sin\alpha\,\hat{j}$$



① $r_1 = 1\,m$

$\hat{r}_1 = \hat{i}$

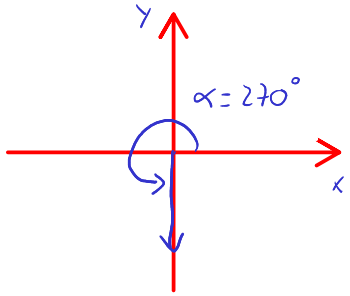
$\vec{g}_1 = -G\,m\,\hat{i}$



② $r_2 = 1\,m$

$\hat{r}_2 = -\hat{j}$

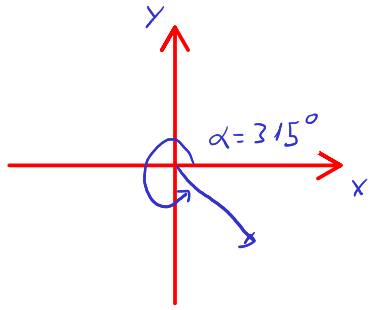
$\vec{g}_2 = -Gm(-\hat{j})$



③ $r_3 = \sqrt{2}\,m$

$\hat{r}_3 = \frac{1}{\sqrt{2}}\hat{i} - \frac{1}{\sqrt{2}}\hat{j}$

$\vec{g}_3 = -\frac{Gm}{2}\left(\frac{1}{\sqrt{2}}\hat{i} - \frac{1}{\sqrt{2}}\hat{j}\right)$



$\vec{g} = \vec{g}_1 + \vec{g}_2 + \vec{g}_3$

$= -Gm\left[\left(1 + \frac{1}{2\sqrt{2}}\right)\hat{i} + \left(-1 - \frac{1}{2\sqrt{2}}\right)\hat{j}\right]$

$= 1'356\,Gm(-\hat{i} + \hat{j})$

$\vec{F} = M\vec{g}$