77. Consider that the leftmost rod is made of point-like particles (*mass elements*) of infinitesimal mass $dm = (M/L)dx$. The force on each of these, adapting the result of Sample Problem 14-9, is

$$\frac{G(dm)M}{x(L+x)} = \frac{G(M/L)(dx)M}{x(L+x)}$$

where x is the distance from the leftmost edge of the rightmost rod to a particular mass element of the leftmost rod. We take $+x$ to be leftward in this calculation. The magnitude of the net gravitational force exerted by the rightmost rod on the leftmost rod is therefore

$$\left|\vec{F}_{\text{net}}\right| = \frac{GM^2}{L} \int_{d}^{d+L} \frac{dx}{x(L+x)}$$

and is the same (by Newton's third law) as that exerted by the leftmost rod on the rightmost one. The integral can be evaluated (though the problem does not require us to do this), and the result is

$$\left|\vec{F}_{\text{net}}\right| = \frac{GM^2}{L^2} \ln\left(\frac{(d+L)^2}{d(d+2L)}\right) .$$