General Physics I
Example 10 Challenge

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Example 10 - Challenge

$$
\begin{aligned}
f_s &= P_x = P\cos\theta \\
&= (300\ lb)\cos\theta \\
f_{s_max} &= \mu_s \times n \\
&= (0.50)(F_g - P_y) \\
&= (0.50)[(644\ lb) - (P\sin\theta)] \\
&= 322\ lb - \frac{1}{2}[(300\ lb)\sin\theta] \\
&= 322\ lb - [(150\ lb)\sin\theta]
\end{aligned}
$$

$$
\begin{aligned}
f_s &= f_{s_max} \\
(300\ lb)\cos\theta &= 322\ lb - [(150\ lb)\sin\theta] \\
(300\ lb)\cos\theta + (150\ lb)\sin\theta &= 322\ lb \\
(150\ lb)[(2\cos\theta) + \sin\theta] &= 322\ lb \\
(2\cos\theta) + \sin\theta &= \frac{161}{75} \\
\sin\theta &= \frac{161}{75} - (2\cos\theta) \\
\theta_1 &= 10.309^o \qquad (1) \\
\theta_2 &= 42.821^o \qquad (2)
\end{aligned}
$$