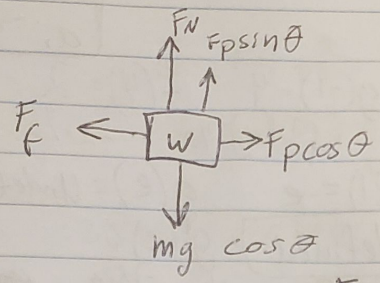
PHYS 407

1.



$$\Sigma F_x = F_p \cos\theta - \mu\left(\frac{F_N}{mg}\right) = 0$$

$$\Sigma F_y = F_N + F_p \sin\theta - mg = 0$$

$$F_p \cos\theta = \mu \frac{F_N}{mg}$$

$$+ F_N = -F_p \sin\theta + mg \qquad F_p = \frac{\mu \frac{F_N}{mg}}{\cos\theta}$$

$$F_p \cos\theta = \mu(-F_p \sin\theta + mg)$$

$$F_p \cos\theta = -\mu F_p \sin\theta + \mu mg$$

$$\frac{F_p \cos\theta}{F_p \sin\theta} = -\mu + \mu mg$$

$$0 = \frac{-\mu mg(-\sin\theta + \mu\cos\theta)}{(\cos^2\theta + \mu\sin^2\theta)^2}$$

$$\cot\theta = \mu mg - \mu$$

$$\theta = \tan(\mu mg - \mu) \qquad 0 = \sin\theta + \mu\cos\theta$$

$$\frac{\sin\theta}{\cos\theta} = \frac{\mu\cos\theta}{\cos\theta}$$

$$F_p \cos\theta + \mu F_p \sin\theta = \mu mg \qquad \tan\theta = \mu$$

$$F_p(\cos\theta + \mu\sin\theta) = \mu mg \qquad \theta = \tan^{-1}\mu$$

$$F_p = \frac{\mu mg}{\cos\theta + \mu\sin\theta}$$

$$y = \frac{C}{\cos x + H\sin x} \qquad \frac{(0)\cdot(\cos x + H\sin x) - (-\sin x + H\cos x)\cdot(C)}{(\cos\theta + H\sin x)^2}$$

$$(\cos\theta + H\sin x)(\cos\theta + H\sin x)$$

$$\cos^2\theta + 2H\sin x\cos x + H^2\sin^2 x$$

$$\cos^2\theta + H^2\sin^2 x = 2H\sin x\cos x$$