PHY201: Homework 1

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1 Horizontally Excited Pendulum

1.1

Under normal assumptions, we would write the position of the pendulum as:

$$\begin{pmatrix} x \\ z \end{pmatrix} = \begin{pmatrix} x_f + l\, sin\theta \\ -l\, cos\theta \end{pmatrix}$$

However for $\theta \ll 1$, we can use the taylor series of the trigonometric functions to approximate $cos\theta \approx 1$ and $sin\theta \approx \theta$. We therefore have:

$$\begin{pmatrix} x \\ z \end{pmatrix} = \begin{pmatrix} x_f + l\theta \\ -l \end{pmatrix}$$

1.2

1.3

1.4

1.5

1.6

2 Equilibrium of Two Masses

2.1

2.2

2.3

2.4

3 Suspended Bar

3.1 One Mass Only

3.1.1

3.1.2

3.1.3

3.1.4

3.1.5

3.1.6

3.1.7

3.2 Connected Masses

3.2.1

3.2.2

3.2.3

3.2.4