Experiment notes
Math 2250−1
Wednesday October 26

Pendulum: measurements and prediction:

```
> restart :
  Digits := 4 :
```

```
> L := 1.526;
  g := 9.806;
  ω := sqrt(g/L); # radians per second
  f := evalf(ω/(2*Pi)); # cycles per second
  T := 1/f; # seconds per cycle
```

$$L := 1.526$$
$$g := 9.806$$
$$\omega := 2.535$$
$$f := 0.4036$$
$$T := 2.478 \quad \textbf{(1)}$$

Experiment:

Mass−spring:
compute Hooke's constant:

```
> 104.0 − 88.3; #displacement from extra 50g
```

$$15.7 \quad \textbf{(2)}$$

```
> k := .05·9.806/.157; # solve k·x=m·g for k.
```

$$k := 3.123 \quad \textbf{(3)}$$

```
> m := .1;  # mass for experiment is 100g
  ω := sqrt(k/m); # predicted angular frequency
  f := evalf(ω/(2·Pi)); # predicted frequency
  T := 1/f; # predicted period
```

$$m := 0.1$$
$$\omega := 5.588$$
$$f := 0.8893$$
$$T := 1.124 \quad \textbf{(4)}$$

Experiment:

Correction term for KE of spring:

```
> ms := .011;  # spring has mass 11g
  M := m + ms/3;  #  "effective mass"
```

$$ms := 0.011$$
$$M := 0.1037 \quad \textbf{(5)}$$

```
> ω := sqrt(k/M);  # predicted angular frequency
  f := evalf(ω/(2·Pi));  # predicted frequency
  T := 1/f;  # predicted period
```

$$\omega := 5.488$$
$$f := 0.8734$$
$$T := 1.145 \quad \textbf{(6)}$$