

1. Use the quotient rule and the facts below to show that: $\frac{d}{dx}(\csc x) = -\csc x \cot x$

- $\csc x = 1/\sin x$
- $\cot x = \cos x/\sin x$
- $(\sin x)' = \cos x$

2. Differentiate the functions.

$$f(\theta) = \theta \cos \theta \sin \theta$$

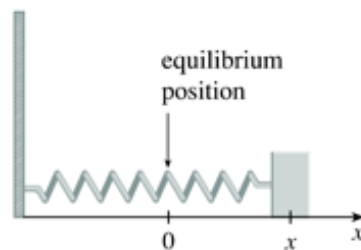
$$h(r) = \frac{ae^r}{b + e^r}$$

$$y = \sec \theta \tan \theta$$

$$f(t) = \frac{\sin t}{3 - 5 \cos t}$$

3. A mass on a spring vibrates horizontally on a surface with friction, as shown. Its equation of motion is $x(t) = \frac{2 \sin t}{e^t}$, where t is in seconds and x is in inches.

(i) Find the velocity and acceleration at time t .



(ii) Find the position and velocity at time $t = \frac{\pi}{2}$.

(iii) Compute $\lim_{t \rightarrow \infty} x(t)$.

4. Find the derivative ... by noticing the pattern:

$$\frac{d^{79}}{dx^{79}}(\cos x) =$$