

1. The average BAC of eight male subjects was measured after consumption of 15 mL of ethanol. The resulting data were modeled by the concentration function

$$C(t) = 0.0225te^{-0.0467t}$$

where  $t$  is measured in minutes after consumption and  $C$  is measured in mg/mL.

- (a) How rapidly was BAC increasing after 10 minutes?

- (b) How rapidly was BAC decreasing half an hour later?

2. The brightness of a star in units of  $m_V$  (apparent magnitude) is given by

$$B(t) = 4.0 + 0.35 \sin\left(\frac{2\pi t}{5.4}\right)$$

where  $t$  is measured in days. Find the rate of change of brightness after one day and interpret your answer. Include units.

3. A mass on a spring is oscillating. Its height at time  $t$  is

$$h(t) = 2e^{-\frac{3}{2}t} \sin(2\pi t)$$

where  $t$  is measured in seconds and  $h$  is measured in centimeters.

1. Make a sketch of  $y = 2e^{-\frac{3}{2}t}$ ,  $y = -2e^{-\frac{3}{2}t}$  and  $y = h(t)$ .
2. Find the velocity of the mass at time  $t$  in general and at time  $t = 1$  second in particular.
3. Compute  $\lim_{t \rightarrow \infty} h(t)$  and interpret what this means.

4. Find all the locations where the tangent to the curve  $y = 2 \cos(x) + \cos^2(x)$  is horizontal.

5. Compute  $f'(t)$  if  $f(t) = e^{at} \sin(bt)$ , where  $a$  and  $b$  are constants.

6. Find  $y''$  if  $y = \cos(\sin(3x))$ .