EXPLAIN YOUR ANSWERS

1. *(5 points).* Define the derivative for the following function.

$$\Gamma\left(\frac{3^x - \cos(x)}{\ln x}\right)$$

$$f'(x) = \lim_{h\to 0} \frac{f(x+h) - f(x)}{h}$$

In this case $f(x)$ is $\Gamma\left(\frac{3^x - \cos(x)}{\ln x}\right)$

$$f'(x) = \lim_{h\to 0} \frac{\Gamma\left(\frac{3^{x+h} - \cos(x+h)}{\ln(x+h)}\right) - \Gamma\left(\frac{3^x - \cos x}{\ln x}\right)}{h}$$

2. *(5 points).* **Hughes-Hallett, Page 112, # 30.** Consider a vehicle moving along a straight road. Suppose $f(t)$ gives the vehicle's distance from its starting point at time t. Which of the graphs in the figure below could be $f'(t)$ for the following scenarios:

(a) A bus on a popular route with no traffic lights.

(b) A car with no traffic and all green lights.

(c) A car in heavy (Los Angeles-like) traffic conditions.

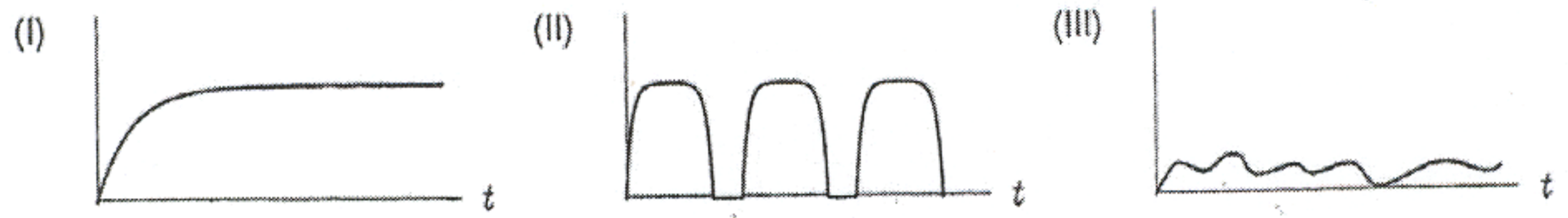

Figure (II) must be B, a car with no traffic and all green lights. $f'(t)$ represents speed of the car, which increases rapidly and then levels off over time (all green lights)

Figure (III) must be A, a bus on a popular route with no traffic lights. It stops repeatedly and stays at zero for a significant period of time

Figure (I) must be C, a car in L.A.-like heavy traffic. The velocity is never very large and is erratic, even hitting zero once.