1. Does Rolle's Theorem apply? If so find an x value on the interval with a horizontal tangent line.

   (a) $f(x) = x(x-1)^2$ $[0, 1]$

   (b) $f(x) = \cos(4x)$ $[\pi/8, 3\pi/8]$

   (c) $f(x) = 1 - |x|$ $[-1, 1]$

2. Does the Mean Value Theorem apply? If so find the point(s) guaranteed to exist.

   (a) $f(x) = 7 - x^2$ $[-1, 2]$

   (b) $f(x) = e^x$ $[0, \ln 4]$

   (c) $f(x) = 3\sin(2x)$ $[0, \pi/4]$

3. Which functions have the same derivative (without evaluating derivatives?)

$$f(x) = \ln x \quad g(x) = \ln 2x \quad h(x) = \ln(x^2) \quad p(x) = \ln(10x^2)$$

4. A car starts from rest at an intersection at an entrance ramp to a highway where the speed limit is 60 mph. At a checkpoint 30 miles away, 28 minutes later the car was clocked at 60 mph exactly.

   (a) How do we know the car was speeding?

   (b) What if it took 30 minutes for the car to reach the checkpoint. Can we still be sure the car was speeding?