

Name: _____

CSUSM Math 160
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THIS IS ONLY A SAMPLE

Exam 2 Sample

Show work, **explain your reasoning** and clearly mark your answers. Please ask about anything that is unclear. Use back sides of pages for scratch and overflow work, but clearly indicate which is which!

No books, no notes, no calculators!

- The height of a particle is given by $h(t) = t^3 - 3t + 3$, where t is in seconds and $t \geq 0$.
 - Find the velocity and the acceleration functions.
 - When is the particle moving upwards? When is it moving downwards?
 - At what time does it reach its minimum height? What is its minimum height?
 - Find the total distance travelled between time $t = 0$ and time $t = 2$.
- Suppose that f and g are differentiable functions and h is given by $h(x) = f([g(x)]^2)$. Suppose further that $f(0) = 3$, $g(0) = 1$, $f'(0) = -2$, $g'(0) = 2$, $f'(1) = -3$, $g'(1) = 4$. Find $h'(0)$, clearly showing your work.
- Find the equation of the tangent line to the curve $y = x^y$ at the point $(1, 1)$. (14 pts)
- Two cars start moving from the same point. One travels south at 60 mph and the other travels east at 25 mph. At what rate is the distance between the two cars increasing two hours later?
- True/False, explain your answer!
 - If $y = e^2$, then $\frac{dy}{dx} = 2e$.
 - $\frac{d}{dx}(\tan^2 x) = \frac{d}{dx}(\sec^2 x)$
 - $\frac{d}{dx}|x^2 + x| = |2x + 1|$
 - If f and g are differentiable, then $\frac{d}{dx}[f(x)g(x)] = f'(x)g'(x)$.
- Find the derivatives of the following functions. In parts (c) and (d) simplify your answer!
 - $f(x) = (1 + \tan(e^x))^3$
 - $g(x) = 10^{\sin^{-1}(x^2)}$
 - $h(x) = \ln\left(\frac{x^2}{\cos x}\right)$
 - $k(x) = \frac{\sin^2(\sqrt{x \tan^{-1} x}) + \cos^2(\sqrt{x \tan^{-1} x}) - \sin^2(\ln(\sin^{-1} x))}{\cos^2(\ln(\sin^{-1} x))}$