MATH 80: TEST #2

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Please show all your work. No credit will be given for unsupported answers. You may not use calculators. You do not have to simplify unless it it explicitly stated. Good luck!

Problem #1. *State a definition of the derivative of a function f at a. Use this definition to compute the derivative of the following functions at a:*

$$f(x) = \sqrt{5x}$$

Problem #2. *Compute the following limits:*

$$\lim_{s \to 0} \frac{\cot(2s)\sec(3s)}{\csc(5s)}$$

Problem #3. *Compute the following derivatives using various differentiation rules. Indicate explicitly which rules you are using where.*

$$\frac{d}{dz}\left(\frac{z\sin^2(z)\tan^2(2z)}{\cos^3(3z)}\right)$$

Problem #4. *Compute an equation of the tangent line to the curve $x^8 + 5x^4y^2 + y^6 = 7$ at the point $(1, 1)$.*

Problem #5. *A rocket is launched from a 3200 ft high mountain with the initial speed of 1600 ft/sec. The height of the rocket at the time t is given by the equation*

$$H(t) = 3200 + 1600t - 16t^2.$$

Use derivatives to compute the velocity and acceleration of the rocket at time t. Also compute the greatest height the rocket achieves during during the flight.