Calculus I Review Test 2 Summer 2018

1. Find the derivative of $f(x) = \left(x^5 + 4x^3 - 6x^{-1}\right)^4$.

2. Use the quotient rule to find the derivative of $f(x) = \cot(x) = \frac{\cos(x)}{\sin(x)}$.

3. Find the derivative of $f(x) = \cos[(3x^2 + x^3 + 3x^5)^4]$ (Do not simplify)

4. Find the slope of the line tangent to the graph of the equation $y^5 + 4x - x^3 \sin y - 4 = 0$, at the point (2, 0).

5. Suppose a spherical snowball is melting and the radius is decreasing at a constant rate, changing from 12 in. to 8 in. in 45 minutes. How fast was the volume changing when the radius was 10 in.? ($V = 4/3\pi R^3$)

6.

   a. Use the tangent line approximation method to approximate $\sqrt[7]{127}$, and $\sqrt[7]{136}$.

   b. Explain their relative accuracy compared to your calculator's value.

7. For the function $y = x^5 + 6x^2 - 50x + 20$, use the first guess $x_1 = 4$.

   a. Find x_2 longhand using the Newton's method formula: $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$.

   b. Write a MathCAD program and find $x_1, x_2, x_3, \ldots x_6$ for all the roots of the function.

8. Use the geometric method in the text to prove that $\lim_{x \to 0} \frac{\sin(x)}{x}$.

9. Use the limit definition of the derivative to **derive** the formula for the derivative of f (x) = sin x.