

In-Class Assignment 3

MATH 141

Directions: Work neatly on a separate sheet of paper. Your group will hand in one write-up with everyone's name on it. **DO NOT** fold the corner over to hold everything together! Your final write-up should be very neat and well-written. Remember to use complete sentences as appropriate.

Work together on each problem; do not delegate different problems to different people.

1. Pascal's triangle is a famous mathematical object that is defined as follows: The first and last entry in each row is a 1, and every other entry is the sum of the two immediately above it. Entries in each row are offset from those in the previous row. Here are the first three rows of Pascal's triangle, numbered 0 through 2.

row	Triangle		
0	1		
1	1	1	
2	1	2	1

Using the rule described above, determine the next 8 rows of Pascal's triangle.

2. Compute. Use Pascal's triangle once you see how it helps.
 - (a) Compute $(x + h)^2$.
 - (b) Compute $(x + h)^3$.
 - (c) Compute $(x + h)^4$.
 - (d) Compute $(x + h)^5$.
 - (e) Compute $(x + h)^{10}$.
3. Using your results from the previous problem and the **definition** of the derivative of f , compute the derivative of each function. Be sure to show your work on your write-up; I want to see more than just the derivative.
 - (a) $f(x) = x^2$
 - (b) $f(x) = x^3$
 - (c) $f(x) = x^4$
 - (d) $f(x) = x^5$
 - (e) $f(x) = x^{10}$
4. Generalize your work above: if $f(x) = x^n$ for a positive integer n , then what is $f'(x)$?
5. Let $f(x) = c$, where c is a constant. Determine $f'(x)$.
6. Determine the derivative of $h(x) = f(x) + g(x)$ by using the definition of the derivative. Assume that both $f(x)$ and $g(x)$ are differentiable.
7. Suppose you know $f(x)$ and $f'(x)$. If c is a constant (doesn't depend on x) and $g(x) = cf(x)$, what is $g'(x)$? (Use the definition of the derivative.)