

MTH 495/595 Homework Topic 6

1.  $f(x) = 2x^3$

a. Using Pascal's Triangle and the Binomial Coefficients as a guide, multiply out  $f(x+h) = 2(x+h)^3$ .

b. Use Fermat's Method and your work from part a) to compute  $f'(x)$  for  $f(x) = 2x^3$ .

2. For each of the following, use the Power rule to determine  $f'(x)$ . Carefully show your work, don't skip steps. Give your answers without negative exponents.

a.  $f(x) = x^7$

b.  $f(x) = \sqrt[3]{x} = x^{\frac{1}{3}}$

c.  $f(x) = \frac{1}{x^4}$

d.  $f(x) = x^\pi$

e.  $f(x) = \frac{1}{\sqrt[4]{x}}$

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

g.  $f(x) = \frac{x^2}{\sqrt[5]{x^3}}$

3. Find the equation of the tangent line of each of the above at  $x = 1$  for the functions in 2b and 2c.