1. Take f to be the function that is given by

$$f(x) = 5x + 2 + E_{-1}(x)$$

where E_{-1} is $o(x+1)$. Determine $f'(-1)$ and determine an equation for the line L that is tangent to f at $(-1, f(-1))$.

2. Take $f(x) = x^3$. Write the local linear approximation of f at $a = 1$. Use your local linear approximation to approximate $(1.05)^3$.

3. The following functions are continuous at $x_0 = 1$, but are not differentiable at $x_0 = 1$. Explain why.

a) $f(x) = |x - 1|$

b) $f(x) = \sqrt{x-1}$

4. Calculate the derivative of each function by decomposing it into a sum and or product of simpler functions and by using the appropriate derivative rule.

a) $f(x) = 5x^4 + \sin(x) - \mathrm{e}$

b) $f(x) = x^{4/5}\exp_5(x) + \sqrt{x}\tan(x)$

5. Calculate the derivative of each function f.

a) $f(x) = \frac{1}{\sin(x)}$

b) $f(x) = \frac{x+3}{\ln(x)}$

c) $f(x) = \exp(x) \cdot \frac{2x}{\exp(x)+\cos(x)}$

6. Calculate the derivative of each function f.

a) $f(x) = \sqrt{4\cos(x) + \ln(x)}$

b) $f(x) = \sin(e^x)\cos(3x + 1)$

7. For the function f given below, decompose f into simpler functions in order to find a formula for $f'(x)$:

$$f(x) = (3x + 5)^4\sqrt{x^5 - x} + g(3x + 1) + (g(x))^3,$$

where g is a differentiable function. Your answer will involve g' and g.

8. Use Newton's Method to approximate the value $5^{\frac{1}{5}}$. Start with an initial guess of $x_1 = 1$ and apply the method three times.