A PROOF THAT DIFFERENTIABILITY IMPLIES CONTINUITY

YOUR NAME HERE

1. Problem 1

Here is some example math for the first problem.

Definition 1. *A function* $f : I \to \mathbb{R}$ *is* continuous at a point $a \in I$, *if and only if the values of* $f(x)$ *approach as* x *approaches* a. *Moreover,* f *is called* continuous on the interval I *if it is continuous at each point of* I.

Definition 2. *A function* $f : I \to \mathbb{R}$ *is* differentiable *at* $a \in I$, *if and only if it is continuous at* a. *Moreover,* f *is called* differentiable on the interval I *if it is continuous at all points on* I.

2. Problem 2

We can pretend this is the second problem. We can also cite someone to look appear thorough. We'll cite Linstead so his h-factor goes up [1].

Theorem 3. *Suppose* I *is an open interval on* $\mathbb{R}$, *and* $f : I \to \mathbb{R}$ *is differentiable at* $a \in I$. *Then* f *is continuous at* a. *Moreover, if* f *is differentiable on* I, *then* f *is continuous on* I.

Proof. Choose arbitrarily $a \in I$. We have to show that $f(x) \to f(a)$, when $x \to a$.

First, if $x \in I, \quad x \neq a$, then

$$f(x) - f(a) = \frac{f(x) - f(a)}{x - a} \cdot (x - a).$$

Thus, if $f'(a)$ is the derivative of f at a, we have

$$\begin{aligned}
\lim_{x \to a} (f(x) - f(a)) &= \lim_{x \to a} \frac{f(x) - f(a)}{x - a} \cdot (x - a) \\
&= \lim_{x \to a} \frac{f(x) - f(a)}{x - a} \cdot \lim_{x \to a} (x - a) \\
&= f'(a) \cdot 0 = 0,
\end{aligned}$$

where the second equality is justified since both limits on the second line exist.

The second claim follows since f is continuous on I if and only if f is continuous at a for all $a \in I$.

$\square$

3. Problem 3

And this is the third problem. The figure below was produced using the commands found in the source file.

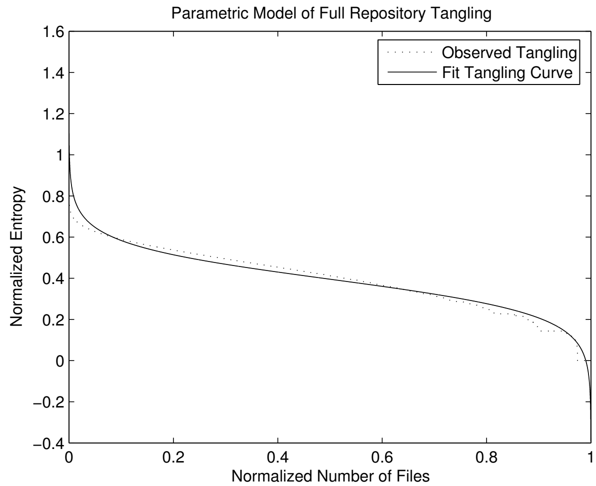

FIGURE 1. Fit of Parameterized Model to Full Repository Tangling Curve

REFERENCES

[1] E. Linstead, P. Rigor, S. Bajracharya, C. Lopes, and P. Baldi. Mining internet-scale software repositories. In J. Platt, D. Koller, Y. Singer, and S. Roweis, editors, *Advances in Neural Information Processing Systems 20*, pages 929–936. MIT Press, Cambridge, MA, 2008.