Newton's Method

$f(x) = x^3 + x^2 + x - 1$ $\qquad$ $f'(x) = 3x^2 + 2x + 1$

Start with x0 = 1

L_0: Pt: f(1) = 2 => (1,2) Slope: f'(1) = 6	$y - 2 = 6\,(x - 1)$ $y = 2 + 6\,(x - 1)$	 $y = f(1) + f'(1)\,(x - 1)$	
Intersect x-axis: Set y=0 and solve for x	$0 = 2 + 6\,(x - 1)$ $6\,(x - 1) = -2$ $x - 1 = -\frac{2}{6}$ $x = 1 - \frac{2}{6}$ $x = \frac{2}{3}$	$0 = f(1) + f'(1)\,(x - 1)$ $f'(1)(x - 1) = -f(1)$ $x - 1 = -\frac{f(1)}{f'(1)}$ $x = 1 - \frac{f(1)}{f'(1)}$ $x = 1 - \frac{2}{6}$ $x = \frac{2}{3}$	
Let x1 be this new value	$x_1 = \frac{2}{3}$	$x_1 = \frac{2}{3}$	
Repeat Process			
L_1: Pt: f(2/3) = 11/27 => (2/3,11/27) Slope: f'(2/3) = 11/3	$y - \frac{11}{27} = \frac{11}{3}\left(x - \frac{2}{3}\right)$ $y = \frac{11}{27} + \frac{11}{3}\left(x - \frac{2}{3}\right)$		
Intersect x-axis: Set y=0 and solve for x	$0 = \frac{11}{27} + \frac{11}{3}\left(x - \frac{2}{3}\right)$ $\frac{11}{3}\left(x - \frac{2}{3}\right) = -\frac{11}{27}$ $x - \frac{2}{3} = -\frac{11/27}{11/3}$ $x = \frac{2}{3} - \frac{11/27}{11/3}$ $x = \frac{5}{9}$		
Let x2 be this new value	$x_2 = \frac{5}{9}$		

Newton's Method

Repeat Process			
L_2: Pt: (5/9,f(5/9)) Slope: f'(5/9)			
Intersect x-axis: Set y=0 and solve for x			
Let x3 be this new value			