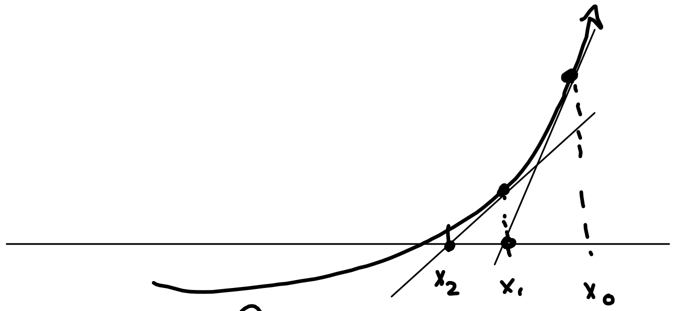
Writing Project #2:

On-Time: 11/3

Test 3: 11/7

Newton's Method is Cool!

Make 1st guess. Find the tangent line at that point. Its intersection with the x-axis is your next guess.



Tangent line @ $x=x_0$:

$$y = f'(x_0)(x-x_0) + f(x_0) \overset{SET}{=} 0$$

$$f'(x_0)x - f'(x_0)x_0 = -f(x_0)$$

$$f'(x_0)x = f'(x_0)x_0 - f(x_0)$$

$$x_1 = x = \frac{f'(x_0)x_0}{f'(x_0)} - \frac{f(x_0)}{f'(x_0)} = x_0 - \frac{f(x_0)}{f'(x_0)}$$

$$x_2 = x_1 - \frac{f(x_1)}{f'(x_1)}$$

$$\vdots$$

$$x_n = x_{n-1} - \frac{f(x_{n-1})}{f'(x_{n-1})}$$

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

3.8 #3 $f(x) = 2x^3 - 3x^2 + 2$. Find its x-int. using

$x_0 = -1 \rightarrow x_1 = -1$

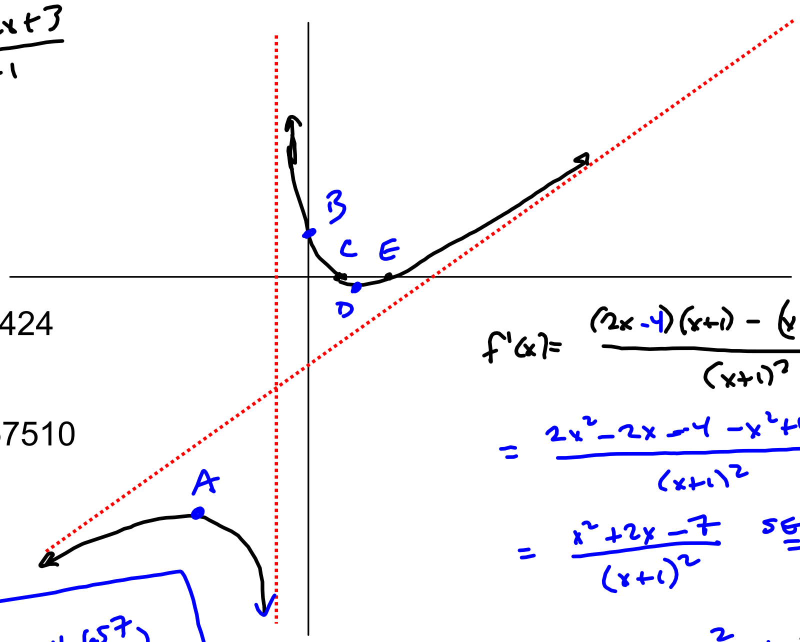
$f'(x) = 6x^2 - 6x$

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

$$x_2 = x_1 - \frac{f(x_1)}{f'(x_1)} = -1 - \frac{2(-1)^3 - 3(-1)^2 + 2}{6(-1)^2 - 6(-1)} =$$

$$= -1 - \frac{-2-3+2}{12} = \frac{-3}{12} = -\frac{1}{4} = \boxed{-.25 = x_2}$$

$$\frac{x^2-4x+3}{x+1}$$



-11.65685424

-0.3431457510

$$f'(x) = \frac{(2x-4)(x+1) - (x^2-4x+3)(1)}{(x+1)^2}$$

$$= \frac{2x^2-2x-4-x^2+4x-3}{(x+1)^2}$$

$$= \frac{x^2+2x-7}{(x+1)^2} \quad \overset{\text{SET}}{=} 0 \Longrightarrow$$

$$x^2+2x+1^2-1-7=0$$

$$\Longrightarrow (x+1)^2-8=0$$

$$x+1 = \pm\sqrt{8} = \pm 2\sqrt{2}$$

$$x = -1 \pm 2\sqrt{2}$$

$A \approx (-1-2\sqrt{2}, -11.657)$

$B = (0, 3)$

$C = (1, 0)$

$D \approx (-1+2\sqrt{2}, -11.657)$

$E = (3, 0)$

$$x^2+3x-6=0 \Longrightarrow$$

$$x^2+3x+\left(\frac{3}{2}\right)^2-\frac{9}{4}+\frac{24}{4}$$

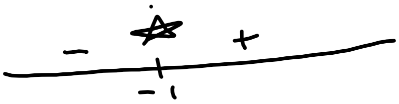
$$=\left(x+\frac{3}{2}\right)^2+\frac{15}{4}=0$$

$$\Longrightarrow x = \frac{-3\pm\sqrt{5}}{2} \approx$$

$$f''(x) = \frac{(2x+2)(x+1)^{\cancel{2}} - (x^2+2x-7)(2\cancel{(x+1)})}{(x+1)^{\boxed{4}} \rightarrow 3}$$

$$= \frac{2x^2+4x+2-2x^2-4x+14}{(x+1)^3} = \frac{16}{(x+1)^3}$$

=



Double-Check:

2nd Derivative Test: $f'(c)=0$:

(i) $f'' < 0$ ☹ MAX

(ii) $f'' > 0$ ☺ MIN

1st Deriv. Test.