MAT 136 (Calculus I), Prof. Jim Swift
In-Class Worksheet: Derivative Shortcuts 2.

This is a pencil-and-paper exercise. No calculators.

Let $f(x) = e^x(1-x)$.

(a) Find the x-intercept(s) and the y intercept of the graph $y = f(x)$.

(b) Find $f'(x)$.

(c) Find the value(s) of x where the graph $y = f(x)$ has a horizontal tangent.

Note $e^x > 0$ for all x

$\frac{d}{dx}(e^x) = e^x$.

(a). x-intercept(s): solve $f(x)=0$ for x:

$e^x(1-x)=0$

$e^x=0$ or $1-x=0$

no solutions $x=1$

x-intercept is 1, or (1, 0)

y-intercept:

$f(0) = e^0(1-0) = 1\cdot 1 = 1$. So y-intercept is 1, or (0, 1)

(b) $f'(x) = \frac{d}{dx}[e^x(1-x)] = \frac{d}{dx}[e^x](1-x) + e^x\frac{d}{dx}[1-x]$

$= e^x(1-x) + e^x(-1)$ OK

$= e^x - xe^x - e^x$

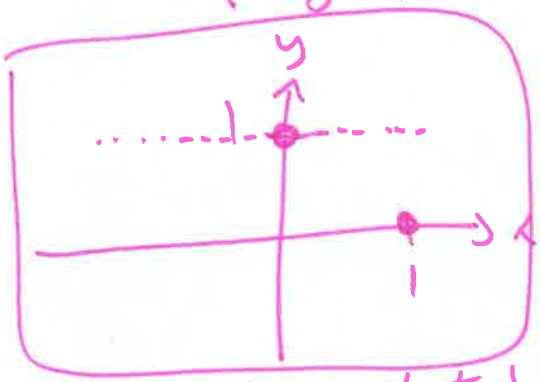
$f'(x) = -xe^x$ more useful.

(c). Solve $f'(x)=0$ to get x-values with horizontal tangent line:

$-xe^x = 0$

$x=0$ or $e^x=0$ ✓ Never

$y=f(x)$ has a horizontal tangent line at $x=0$



we found this ~~about~~ about the graph.

Calculator shows