Extra Credit Section 10.4

Find x so that tangent lines are horizontal

for $f(x) = x^3(x-7)^4$

Use Product Rule

$F = x^3$

$F' = 3x^2$

$S = (x-7)^4$

$S' = 4(x-7)^3(1)$

Use General Power Rule

$f'(x) = FS' + F'S$

$= x^3(4(x-7)^3) + 3x^2(x-7)^4$

$= x^2(x-7)^3[4x + 3(x-7)]$

$= x^2(x-7)^3[4x + 3x - 7] = x^2(x-7)^3(7x-7)$

$= 7x^2(x-7)^3(x-1)$

Horizontal Tangent Line means $f'(x) = 0$

$f'(x) = 0$ when

$x = 0$

$x = 7$

or $x = 1$