Graphing Derivatives

We can relate the graph of a function with its derivative. To do so, remember:

i) **The derivative of a function represents the slope of the tangent line of the function at any defined point, x.**

ii) **For polynomial functions, each time we differentiate we reduce the degree of the polynomial by 1.**

Notes:

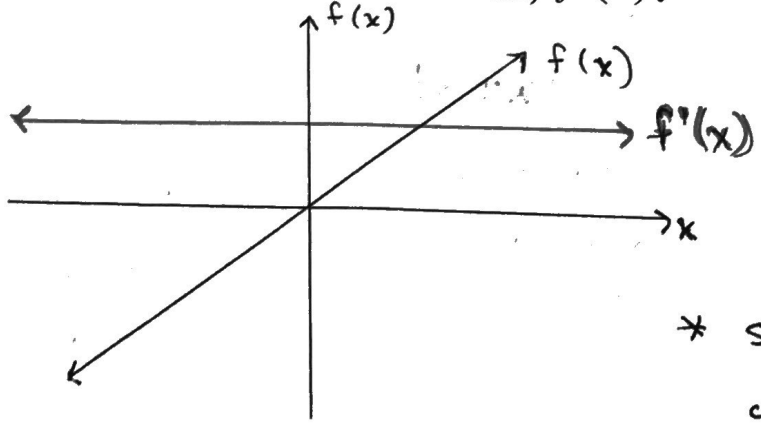
1. **If the slope of the tangent is negative at point $x = a$ (ie: $f'(x) < 0$), then the derivative graph is below the $x-$axis.**

2. **If the slope of the tangent is positive at point $x = a$ (ie: $f'(x) > 0$), then the derivative graph is above the $x-$axis.**

3. **If the slope of the tangent is zero at point $x = a$ (ie: $f'(x) = 0$), then the derivative graph is on the $x-$axis.**

Example 1: **For each of the following graphs of $f(x)$ sketch the derivative function, $f'(x)$.**

a)



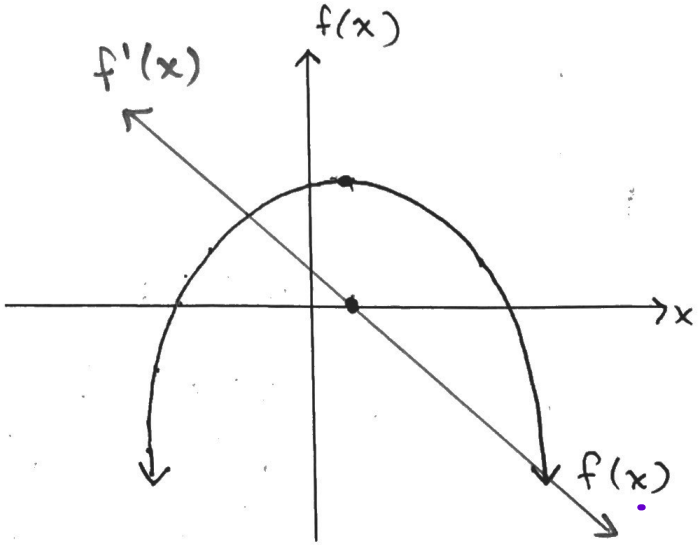
notes:

f(x) is linear

f'(x) is constant

* slope is constant at every point.

b)

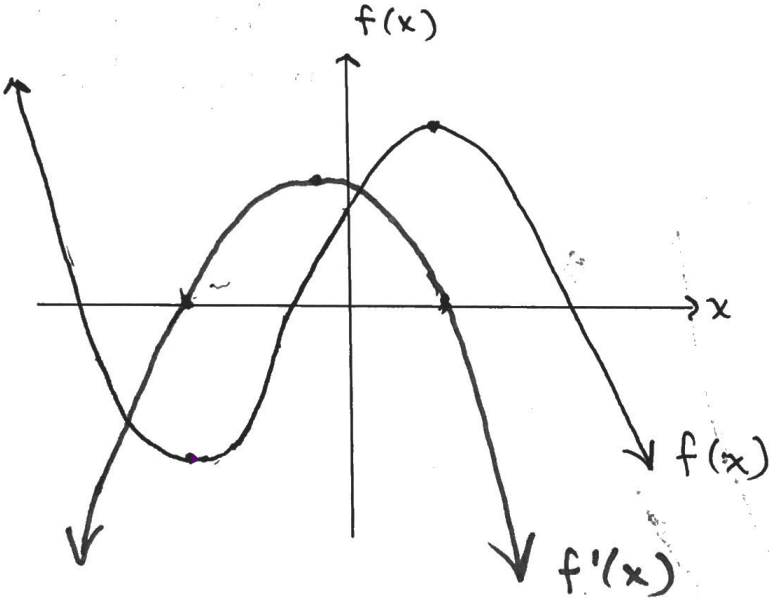


notes:

f(x) is quadratic

f'(x) is linear

c)

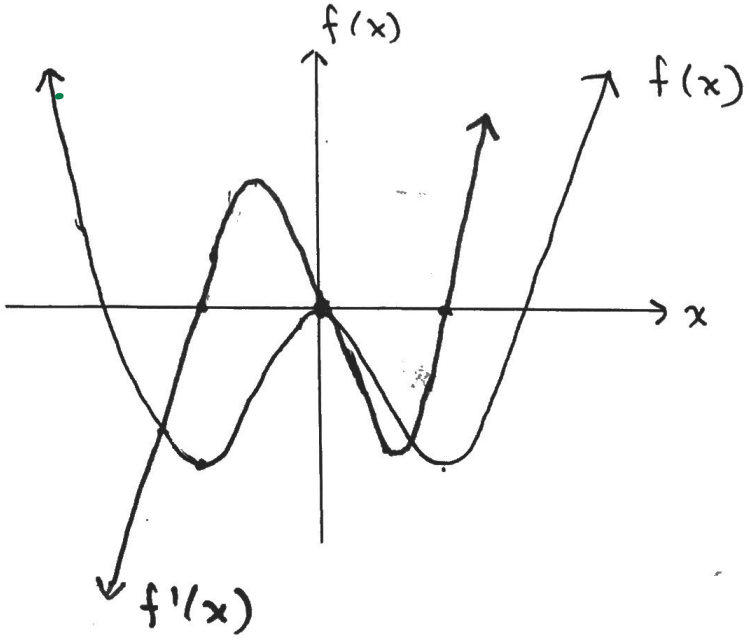


notes:

f(x) is cubic

f'(x) is quadratic

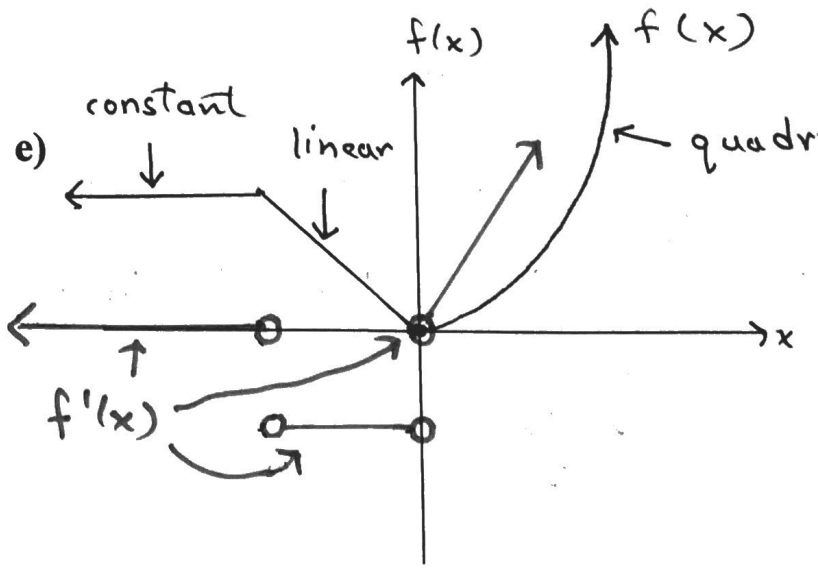
d)



notes:

f(x) is quartic

f'(x) is cubic



notes:

f'(x) is not defined at sharp corners since there is no unique tangent line.

Example 2: **Given $f'(x)$ below, sketch a possible curve for $f(x)$.**