Example

Expand, using the Binomial Theorem, $(1+2x)^5$. Hence, expand $(1-2x)^5$.

$$(1+2x)^5 = \binom{5}{0}(1)^5(2x)^0 + \binom{5}{1}(1)^4(2x)^1 + \binom{5}{2}(1)^3(2x)^2 + \binom{5}{3}(1)^2(2x)^3 + \binom{5}{4}(1)^1(2x)^4 + \binom{5}{5}(1)^0(2x)^5$$

$$= 1(1)(1) + 5(1)(2x) + 10(1)(4x^2) + 10(1)(8x^3) + 5(1)(16x^4) + 1(1)(32x^5)$$

$$(1+2x)^5 = 1 + 10x + 40x^2 + 80x^3 + 80x^4 + 32x^5$$

Hence

$$(1-2x)^5 = 1 - 10x + 40x^2 - 80x^3 + 80x^4 - 32x^5$$

Example

~~Expand~~, using the Binomial Theorem, $(x-3y)^4$. value of middle term ?

5 terms

$n = 4$

$r_{middle} = 2$

$X = x$

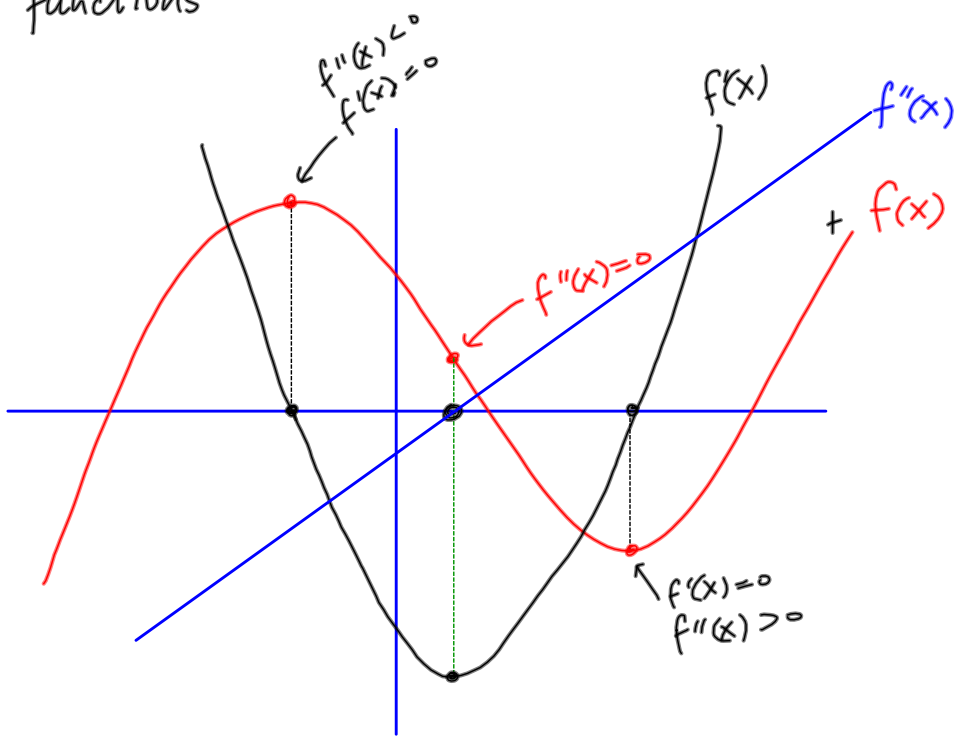
$y = -3y$

$$\text{middle term} = \binom{4}{2}(x)^2(-3y)^2$$

$$= 6x^2(9y^2)$$

$$= 54x^2y^2$$

Slope functions



Show $y = \cos x$
has pt of inflection at $x = \frac{\pi}{2}$

at pt. of inflection $\frac{d^2y}{dx^2} = 0$	$\frac{dy}{dx} = -\sin x$ $\frac{d^2y}{dx^2} = -\cos x$
$x = \frac{\pi}{2}$	$\Rightarrow \frac{d^2y}{dx^2}\Big\|_{(x=\frac{\pi}{2})} = -\cos\left(\frac{\pi}{2}\right) = 0$ $\Rightarrow$ pt. of inflection