2B. Curve sketching

2g)

$y = x^3 - 3x + 1$

$y' = 3x^2 - 3$

$y'' = 6x$

inflection point at $x = 0$

2e)

$y = \frac{x}{x+4}$

$y' = \frac{4}{(x+4)^2}$

$y'' = \frac{-8}{(x+4)^3}$

no inflection points

2h)

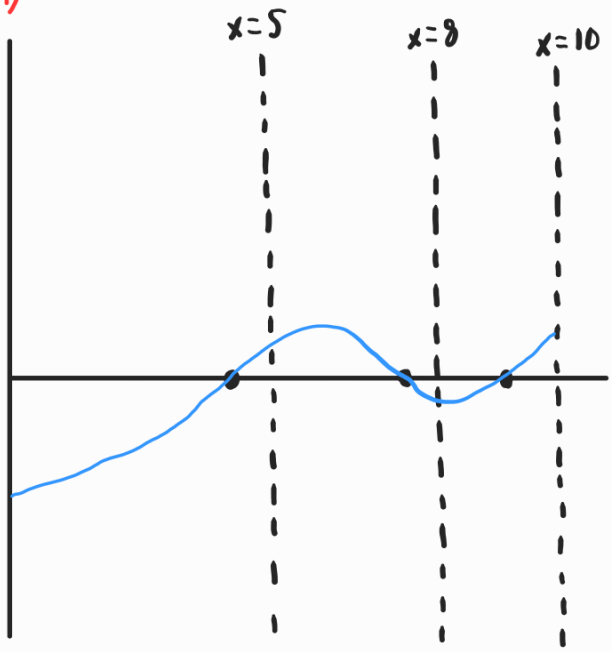
$y = e^{-x^2} = e^u$

$y' = e^u u' = -2xe^{-x^2}$

$y'' = -2e^{-x^2} + 4x^2 e^{-x^2}$

inflection points at $x = \pm \frac{1}{\sqrt{2}}$

4)



6a)

$f(x) = ax^3 + bx^2 + cx + d$

$f'(x) = 3ax^2 + 2bx + c$

$3a + 2b + c = 0$

$3a - 2b + c = 0$

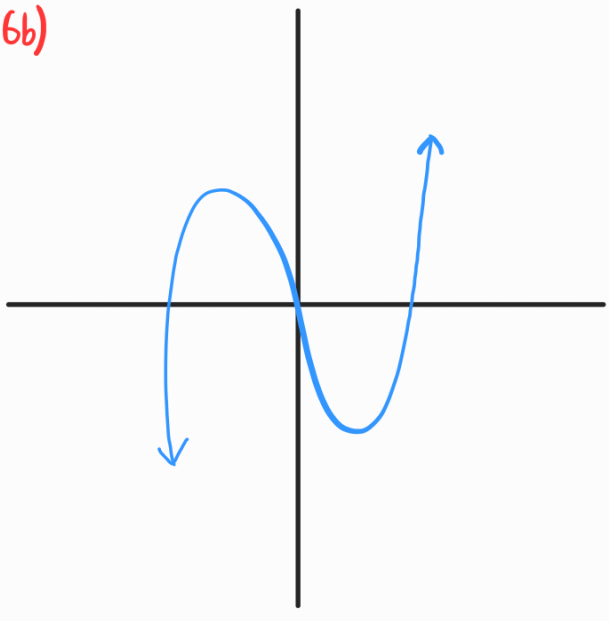
$6a + 2c = 0$

$c = -3a$

$b = 0$

$a > 0$
$b = 0$
$c = -3a$
d = any real number

6b)



7a)

$f'(a) = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x}$

y increasing $\Rightarrow (\Delta y \text{ and } \Delta x > 0)$ or $(\Delta y \text{ and } \Delta x < 0) \Rightarrow \frac{\Delta y}{\Delta x} > 0 \Rightarrow \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x} > 0$

7b)

?