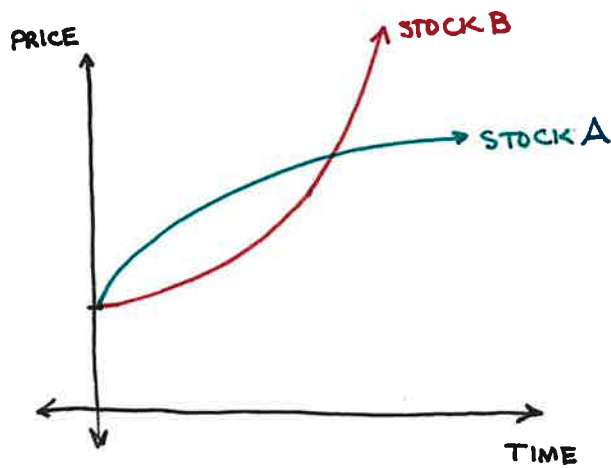


MATH 1325
Chapter 12.2: The Second Derivative

WHICH STOCK IS A BETTER INVESTMENT?



$f(x)$ FUNCTION

$f'(x)$ RATE OF CHANGE OF FUNCTION

$f''(x)$ RATE OF CHANGE OF
RATE OF CHANGE OF FUNCTION

$$f(x) = x^4 + 2x^3 + 3x^2 - 5x + 7$$

$$f'(x) =$$

$$f''(x) =$$

$$f'''(x) =$$

$$f^{(4)}(x) =$$

$$f^{(5)}(x) =$$

THE SECOND DERIVATIVE: THE RATE OF CHANGE OF
THE RATE OF CHANGE

$$f''(x) = y'' = \frac{d^2y}{dx^2}$$

STOCK A PRICE: $f(x) = x^{\frac{3}{2}} + 5$

STOCK B PRICE: $f(x) = .1x^{\frac{3}{2}} + 5$

a) WHEN ARE THE STOCKS INCREASING IN PRICE?

b) WHEN $x = 10$ MONTHS, HOW ARE THE STOCKS CHANGING?

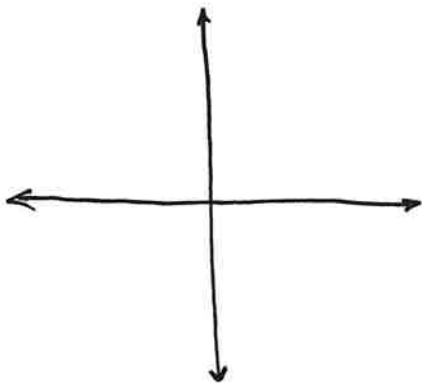
AN OBJECT IS MOVING ALONG A STRAIGHT LINE.
ITS POSITION IN FEET AT TIME t SECONDS IS GIVEN BY

$$s(t) = t^3 - 2t^2 - 7t + 9.$$

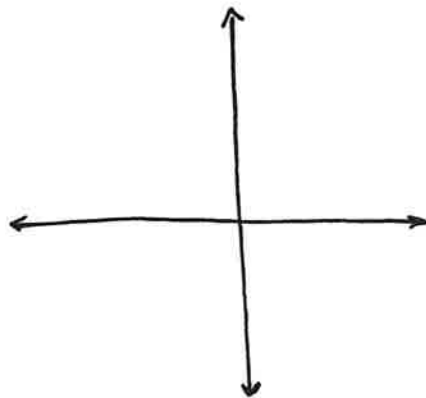
- a) FIND THE VELOCITY AT TIME t . c) WHEN DOES THE OBJECT STOP?

- b) FIND THE ACCELERATION
AT TIME t .

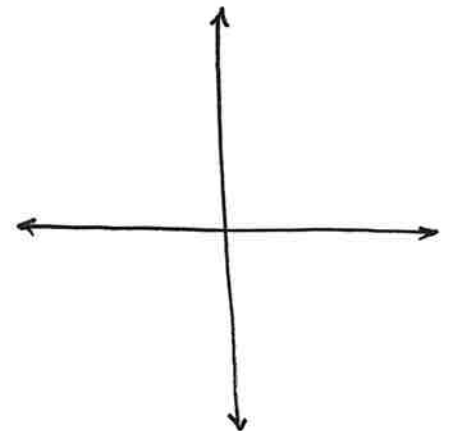
$$f(x) = x^3$$



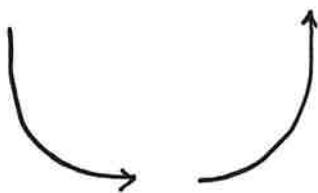
$$f'(x) =$$



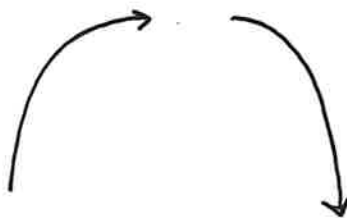
$$f''(x) =$$



CONCAVITY:



CONCAVE
UP



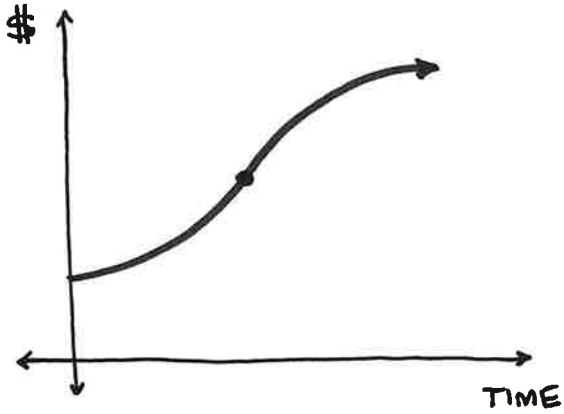
CONCAVE
DOWN

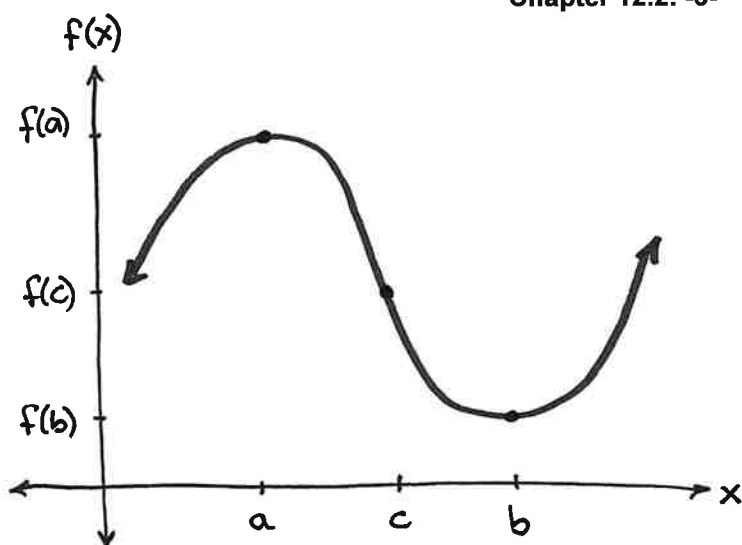
INFLECTION
POINT:

WHEN CONCAVITY
CHANGES

$$f''(x) = 0 \text{ OR } f''(x) \text{ DNE.}$$

GIVEN $f'(x) = 4x^3 - 12x^2$, SKETCH A POSSIBLE $f(x)$.





THE SECOND DERIVATIVE TEST:

$f(x)$ HAS A CRITICAL NUMBER $C \rightarrow f'(c) = 0$.

$f''(x)$ EXISTS.

$$f''(c) > 0$$

$$f''(c) < 0$$

$$f''(c) = 0$$