Determine the intervals of concavity and the inflection points

A) $f(x)=x^{2/5}$

$f(x) = x^{2/5}$

$f'(x) = \frac{2}{5}x^{-3/5}$

$f''(x) = \frac{-6}{25}x^{-8/5}$

$f''(x) = \frac{-6}{25x^{8/5}}$

$f''(x) \neq 0$

$f''(x)$: UND

$x = 0$

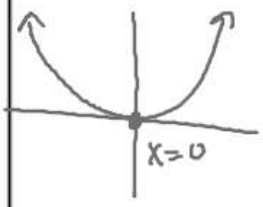
$f''(-1) = \frac{-6}{25} < 0$

$f''(1) = \frac{-6}{25} < 0$

Local Extrema using 2nd derivative test

Determine the local extrema using the second derivative test

A) $y = x^2$



$f(x) = x^2$

$f'(x) = 2x$

$2x = 0$

$x = 0$ C.P.

$f''(x) = 2 > 0$

$f''(0) = 2 > 0$

At C.P. $f(x)$ is concave up so $x=0$ is a local min

(1) Find C.P.

(2) Take 2nd der

(3) Substitute C.P. into 2nd deriv

B) $y = -x^2$

$f(x) = -x^2$

$f'(x) = -2x$ → $f''(x) = -2$

$0 = -2x$

$0 = x$

$f''(0) = -2 < 0$

At the C.P. $f(x)$ is concave down so $x=0$ is local max

Concave up at a critical pt means C.P is a local min

Concave down at a critical pt means C.P. is a local max

Determine the local extrema using the second derivative test

25) $f(x) = x^3 - 12x^2 + 45x$

$f(x) = x^3 - 12x^2 + 45x$

$f'(x) = 3x^2 - 24x + 45$

$0 = x^2 - 8x + 15$

$0 = (x-5)(x-3)$

C.P. $x = 3$ $x = 5$

$f''(x) = 6x - 24$

$f''(3) = -6 < 0$

$x = 3$ local max since $f'' < 0$

$f''(5) = 6 > 0$

$x = 5$ local min since $f'' > 0$

27) $f(x) = 3x^4 - 8x^3 + 6x^2$