Solutions

Math 19: Quiz 7 Name:

For full credit you must (NEATLY) show your work. Partial credit may be given for incorrect solutions if sufficient work is shown.

For the function $f(x) = x^4 - 8x^3 + 10$

i. (2 pts) Find $f'(x)$.

$f'(x) = 4x^3 - 24x^2$

ii. (2 pts) Find the partition numbers of $f'(x)$.

(1) $f'(x) = 0 \Rightarrow 4x^3 - 24x^2 = 0 \Rightarrow 4x^2(x-6) = 0$
$\Rightarrow \boxed{x = 0,\ x = 6}$

(2) $f'(x)$ DNE $\Rightarrow$ none

iii. (4 pts) Find the intervals where $f(x)$ is increasing/decreasing.

x	$f'(x)$
-1	-28
1	-20
7	196

f is increasing on $(6, \infty)$

f is decreasing on $(-\infty, 6)$

iv. (2 pts) Find the local extrema and identify whether each is a local maximum or local minimum.

$x = 6$ is a local min

(Bonus: 1 pt) Draw the graph of a continuous function f that satisfies the following conditions:

always above x-axis ← $f(x) > 0$ on $(-\infty, \infty)$

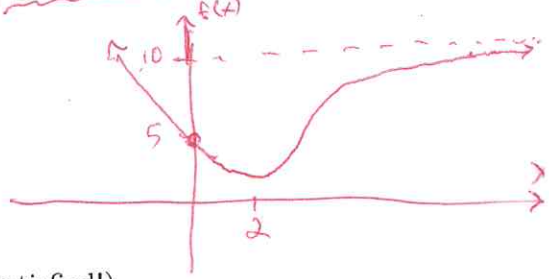
decreasing on $(-\infty, 2)$ ← $f'(x) < 0$ on $(-\infty, 2)$

increasing on $(2, \infty)$ ← $f'(x) > 0$ on $(2, \infty)$

horizontal asymptote at $y = 10$ ← $\lim_{x \to \infty} f(x) = 10$

f must pass through this point ← $f(0) = 5$.

Possible solution:



Label your axes (so that it is obvious that the conditions are satisfied!)