Name: ______________________

Clear your desk of everything except pens, pencils and erasers. Show all work clearly and in order. No notes, phones and calculators. You have 10 minutes to finish the test for 10 points.

The one on the back worth two extra points. Maximum of 10 points will be recorded for each quiz.

1. (5 points) Find the linearization of $f(x) = \frac{1}{\sqrt{x}}$ at the point $x = 4$ and use this linearization to find a good approximation of $\frac{1}{\sqrt{4.01}}$ (Do not simplify).

$f(x) = \frac{1}{\sqrt{x}} = x^{-\frac{1}{2}}$, $f'(x) = -\frac{1}{2} \cdot x^{-\frac{1}{2}-1} = -\frac{1}{2} \cdot x^{-\frac{3}{2}}$.

"at $x=4$" means $a=4$, $f(4) = \frac{1}{\sqrt{4}} = \frac{1}{2}$. $f'(4) = -\frac{1}{2} \cdot 4^{-\frac{3}{2}} = -\frac{1}{2} \cdot \frac{1}{(\sqrt{4})^3}$

$= -\frac{1}{16}$

Linearization at 4 : $\boxed{L(x) = -\frac{1}{16}(x-4) + \frac{1}{2}}$

$\frac{1}{\sqrt{4.01}} = f(4.01) \approx L(4.01) = \boxed{-\frac{1}{16} \cdot (4.01-4) + \frac{1}{2}} = -\frac{1}{1600} + \frac{1}{2}$

2. (5 points) Find all the critical points (critical numbers) of $f(x) = x^2(2x - 6)$ on the interval $[-2, 1]$

$f(x) = x^2(2x-6) = 2x^3 - 6x^2$

$f'(x) = (2x^3 - 6x^2)' = 2 \cdot 3x^2 - 6 \cdot 2x = 6x^2 - 12x$.

Set $6x^2 - 12x = 0$

$\Leftrightarrow 6x(x-2) = 0 \Rightarrow x = 0$ or $x = 2$.

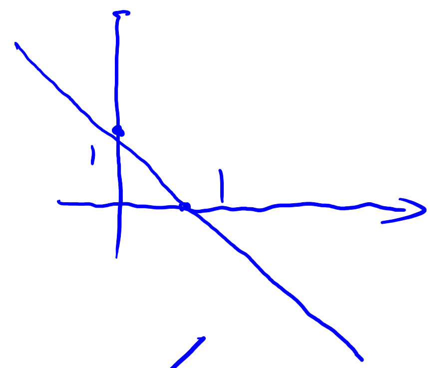
Interval: $[-2, 1]$.

Critical number in $[-2, 1]$ is $\boxed{x=0}$

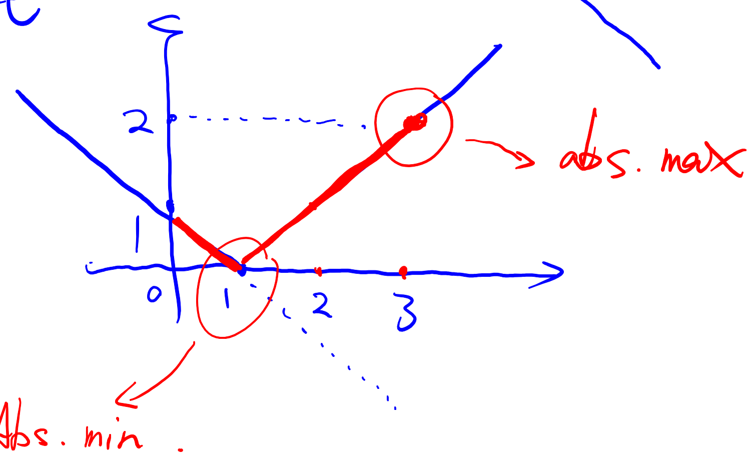
(★ Finish the problems on the front page first. No more than 10 points may be earned on the quiz. The extra problem is of average (or above) actual exam difficulty level. It is recommended to do it now or later to check whether you handle the materials well enough for the exam.)

[2 extra points] Find the absolute maximum and absolute minimum values of of $y = |1 - x|$ on the interval $[0, 3]$.

Plot the graph of $y = 1 - x$



Fold the bottom part



Abs max is 2 ($y=2$), at $x=3$.

Abs min is 0 ($y=0$), at $x=1$