In-class Exam #1: Prep

MATH 120 — Calculus & Applications
September 28/29

Please print your name:

No notes, calculators or tools of any kind are permitted. There are 22 points in total.

Good luck!

The actual in-class exam will be similar but shorter (with more space for answers).

Problem 1. (2 points) Given $f(x) = 2x^4 - 3\sqrt{x} + 7x - 4^2$, compute $f'(x)$.

Problem 2. (2 points) Consider the graph of $y = 1 + \sqrt{x}$. Determine the tangent line at $x = 4$.

Problem 3. (2 points) Consider the function $f(x) = 2x^3 + 5x$.

(a) Is $f(x)$ increasing/decreasing at $x = -1$?

(b) Is $f(x)$ concave up/down at $x = -1$?

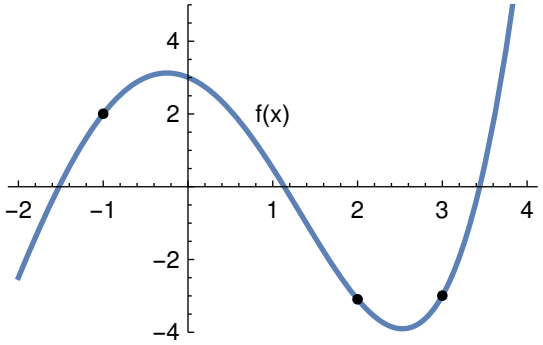
Problem 4. (3 points) The first and second derivatives of the function $f(x)$ have the following values:

	$x<-2$	$x=-2$	$-2<x<-1$	$x=-1$	$-1<x<0$	$x=0$	$0<x<1$	$x=1$	$1<x<3$	$x=3$	$x>3$
$f'(x)$	$-$	0	$+$	$+$	$+$	0	$+$	$+$	$+$	0	$-$
$f''(x)$	$+$	$+$	$+$	0	$-$	0	$+$	0	$-$	0	$-$

Determine the location of all local minima, local maxima and inflection points.

Armin Straub
straub@southalabama.edu

Problem 5. (3 points) Use the graph below to fill in each entry of the grid with positive, negative or zero.



	$f(x)$	$f'(x)$	$f''(x)$
$x=-1$			
$x=2$			
$x=3$			

Problem 6. (2 points) A classmate needs to find the local extrema of the function $f(x)=x^4-\frac{4}{3}x^3-4x^2+24x+1$. She already found that the critical points are at $x=-1$, $x=0$ and $x=2$. Help her conclude what the local extrema are.

Problem 7. (2 points) Let $T(x)$ be the time in hours it takes to produce x units.

(a) The units for $T'(x)$ are .

(b) The units for $T''(x)$ are .

Problem 8. (3 points) A small rectangular garden of area 80 square meters is to be surrounded on three sides by a brick wall costing 5 dollars per meter and on one side by a fence costing 3 dollars per meter. Find the dimensions of the garden such that the cost of the fence is minimized.

Problem 9. (3 points) Given the cost function $C(x)=\frac{1}{2}x^3-15x^2+200x+4$, find the minimal marginal cost.

Armin Straub
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