

Name: _____

Math 151-02, Calculus I – Crawford

Exam 1-A

19 September 2017

Score

1	/8
2	/12
3	/8
4	/24
5	/16
6	/16
7	/6
8	/6
9	/6
Total	/100

- Calculators, books, notes (in any form), cell phones, and any unauthorized sources are **not** allowed.
- Clearly indicate your answers.
- ***Show all your work*** – partial credit may be given for written work.
- Problems #1 & 2 will be used to determine extra-credit for Homework Check 1.
- ***Good luck!***

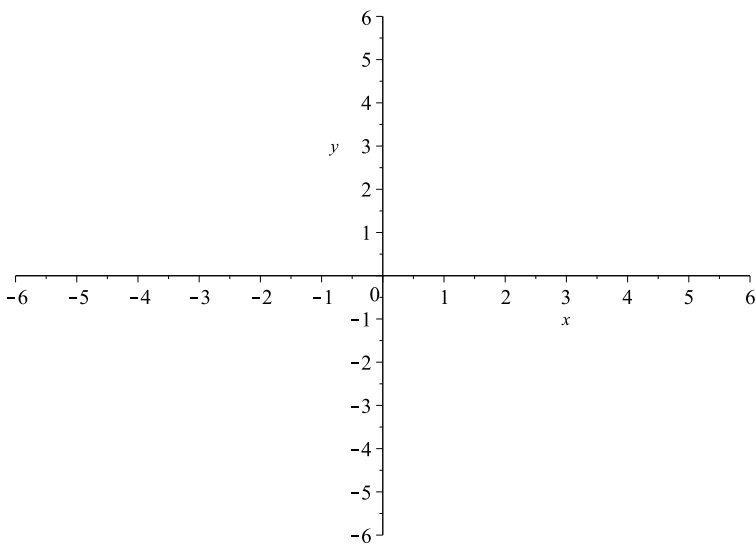
1. (8 pts). Find the domain of $f(x) = \frac{\sqrt{3-2x}}{x}$.

2. (12 pts). Solve the following inequality for x .

$$x^3 - 3x^2 - 10x \leq 0$$

3. (8 pts). Sketch a function that has all of the following properties.

$$\lim_{x \rightarrow 2^-} f(x) = 3, \quad \lim_{x \rightarrow 2^+} f(x) = 1, \quad f(2) = 3, \quad \lim_{x \rightarrow -3} = -\infty, \quad \lim_{x \rightarrow 4} = 5$$



4. (24 pts). Evaluate the following limits, if they exist. Clearly indicate $+\infty$ or $-\infty$ in the case of an infinite limit. If the limit does not exist, **clearly explain the reason why.**

(a). $\lim_{x \rightarrow -3} \frac{x^2 + 3x}{x^2 + 2x - 3}$

(b). $\lim_{x \rightarrow 1} \frac{2x - 1}{x - 1}$

(c). $\lim_{x \rightarrow 4} g(x)$ where $g(x) = \begin{cases} x^2 - 1, & x \leq 4 \\ 3x + 3, & x > 4 \end{cases}$

5. (16 pts). The position of a particle at time t seconds is given by $s(t) = \sqrt{2t}$ cm.

(a). Find the average velocity of the particle over the time interval $[2, 8]$. [Include units in your answer.]

(b). **Use the limit definition** $v(a) = \lim_{t \rightarrow a} \frac{s(t) - s(a)}{t - a}$ to find the instantaneous velocity when $t = 8$.
[Include units in your answer.] **You must use the limit definition and you must show all of your work.**

[Note: $s'(t) = v(t) = \frac{1}{\sqrt{2t}}$, if you want to check your answer.]

6. (16 pts). Let $f(x) = 1 - 3x^2$.

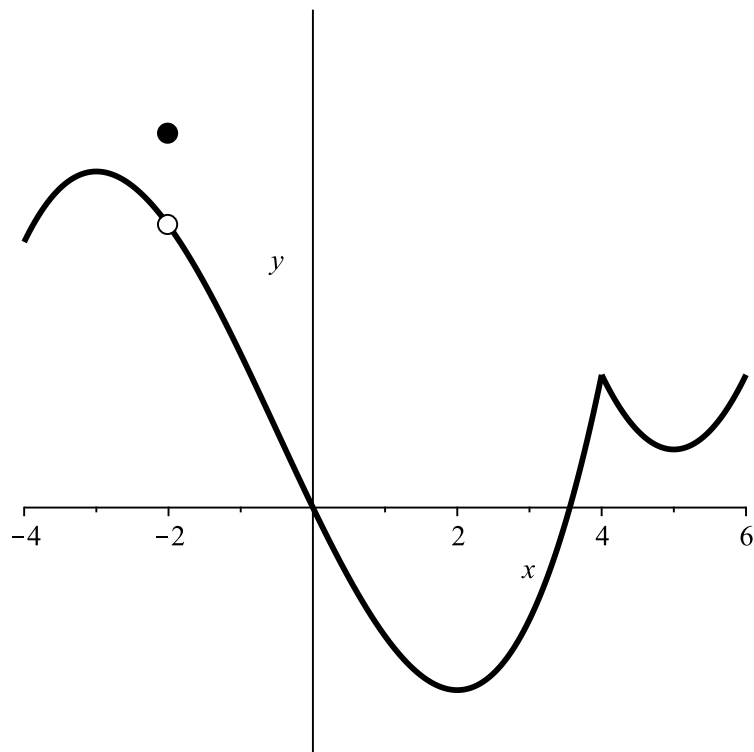
(a). Use the limit definition $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ to show that the derivative is $f'(x) = -6x$.

You must use the limit definition and you must show all of your work.

(b). Find an equation of the tangent line to the graph at $x = 2$.

7. (6 pts). Write down a function $f(x)$ whose graph has an infinite discontinuity at $x = 3$ and a removable discontinuity at $x = 6$. [You must write down a function $f(x)$. A graph of the function is not acceptable.]

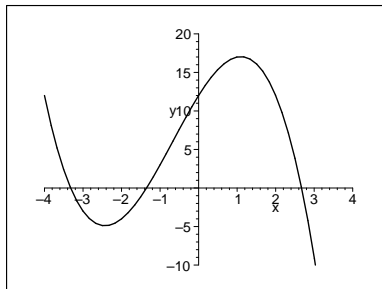
8. (6 pts). The graph of f is given below. For which values of x is f not differentiable?



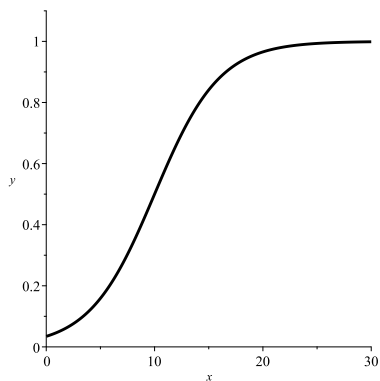
9. (6 pts). *True or False.* Clearly indicate whether the following statements are true or false.

T F If $f(x) = \frac{12}{x}$ then the Intermediate Value Theorem guarantees that $f(x)$ will go through $y = 1$ for some value of x in the interval $(-2, 1)$.

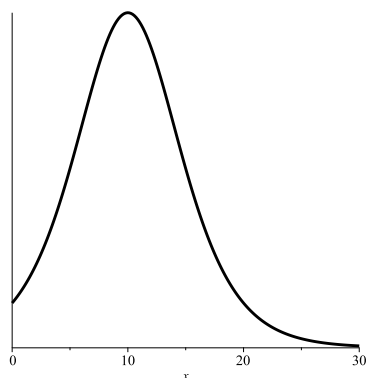
T F If the graph of a function $y = f(x)$ is given below, then the derivative $f'(2) > 0$.



T F Given the graph of $y = f(x)$ below left, its derivative is given by the graph below it.



$y = f(x)$



Is this the derivative $f'(x)$?