

Name: _____ I.D.#: _____ Serial #: _____

Section #:

15

17

Question #	1	2	3	4	5	6	7	8	9	Total
Grade	/4	/5	/6	/4	/4	/4	/4	/4	/5	/40

Show all of your work**Solve all questions**Q1 Find the equation of the tangent line to the graph of $f(x) = 5x^3 - 3x^2 - x + 2$ at $x = 1$ Q2 Let $y = \frac{1}{x}$, find y' , y'' , and y''' . Determine $y^{(10)}$ Q3 Find $\frac{df}{dx}$ for each of the following if $f(x)$ is

a. $f(x) = 2x^3 - 3\sqrt{x^3 - 2x^2}$

b. $f(x) = \frac{2x^3}{x-1}$

Q4 Let the function $f(x) = 3x^2 - 2x + 1$. Use the basic definition of derivative to find $f'(4)$ Q5 Find a positive number M , such that if $|x| > M$, then $|\frac{2x}{x^2} - 2| < 0.0002$, which explains that

$$\lim_{x \rightarrow \infty} \frac{2x}{x^2} = 2$$

Q6 $\lim_{x \rightarrow 0} \frac{1 - \cos 2x}{x \sin 3x}$

Q7 Let $f(x) = \begin{cases} \frac{\sqrt{x^2 - 1} - 1}{x^2} & \text{if } x \neq 0 \\ a & \text{if } x = 0 \end{cases}$. Find the value of a so that $f(x)$ is continuous at $x = 0$.

Q8 $\lim_{x \rightarrow \infty} \sqrt{x^2 - 2x} - x$

Q9 Let f be a differentiable function everywhere, and suppose that $f(x+y) = f(x) + f(y) + 2xy$, and

$$\lim_{h \rightarrow 0} \frac{f(h)}{h} = 5. \text{ Find } f'(x)$$