Test 1A, Math 152

Name: _____

PID Number: _____

I pledge that I have neither given nor received any unauthorized assistance on this exam.

_____

(*signature*)

DIRECTIONS

1. Show all of your work. A correct answer with insufficient work will be counted wrong.
2. Clearly indicate your answer by putting a box around it.
3. Calculators are allowed on this exam, but NOT cell phones or laptops.
4. Give all answers in exact form, not decimal form (that is, put $\frac{4}{7}$ instead of 0.5714, $\sqrt{2}$ instead of 1.414, etc) unless otherwise stated.
5. Make sure you sign the pledge and write your PID on both pages.
6. There are 9 questions and 100 total points.

PID Number: _____

1. (10 points) Use the 4-step process to find $f'(x)$ if

$$f(x) = \frac{-2}{x^2}$$

You can check your answer by using other methods, but you will only receive credit for using the 4-step process.

2. (15 points) The total amount Michael Jackson has earned from the album *Thriller* is approximated by the function

$$M(x) = \frac{65x^3}{x^3 + 1}$$

Where $M(x)$ is measured in millions of dollars and x is the number of years since the album's release. How fast are the total earnings changing 2 years after the release? (If necessary, round off your answer to the nearest dollar).

3. (8 points) List the value (or values) of x at which the function $f(x) = \dfrac{x-4}{x^2-x-12}$ is not continuous. Use the 3-part definition of continuity to explain why $f(x)$ is not continuous at that point (or those points).

4. (12 points) Find, if they exist, the following limits. If the limits do not exist, show/state why.

(a) $\lim_{x\to(-\infty)} \dfrac{3x^2-5}{7x^5+2x^4-3x}$

(b) $\lim_{x\to(-2)} \dfrac{x^2+3x+2}{x^2-3x-10}$

(c) $\lim_{x\to(3)} \dfrac{x^2+3x+2}{x^2-3x-10}$

(d) $\lim_{t\to(3^-)} \dfrac{t^2}{t^2-9}$

5. (10 points) Let

$$f(x) = \begin{cases} 3 - x & \text{if } x < 5 \\ 2 & \text{if } x = 5 \\ 4x - 22 & \text{if } x > 5 \end{cases}$$

Use the three-part definition of continuity at a number to determine whether or not the function f is continuous or discontinuous at $x = 5$. Make sure to explain your answer.

6. (10 points) Find the derivative of

$$y = \frac{3}{\sqrt[5]{x}} + \frac{7}{2x^4} - 18$$

Simplify your answer to the extent of reducing fractions to lowest terms, i.e. $\frac{2}{5x}$ instead of $\frac{4x}{10x^2}$

7. (10 points) Find the derivative of

$$h(x) = (3x + 2)(x^2 - 9x + 6)^8$$

You do not need to simplify your answer.

8. (15 points) Find the exact value of the derivative $g'(3)$, if $g(t) = \dfrac{4}{\sqrt{19-5t}}$. Write your answer as a fraction in lowest terms.

9. (10 points) Find the equation of the tangent line to the graph of

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

at the point where $x = 2$. Write your answer in the form $y =$ _____

Extra Credit: (2 points) Find $f'(x)$ if $f(x) = \pi^2$