

MATH 171 - Second Exam October 26, 2000

Your Name: _____ Your TA's Name: _____

*Show all work! Be sure to cross out anything that you do not want graded.
Incorrect work left on your paper will cause you to lose points
even if there is also correct work displayed.*

Problem	Points
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total	

1. (10 pts.) Find the equation of the tangent line to $y = (x^3 - 2x)^4$ when $x = -1$.

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2. (12 pts.) Find the *slope of the tangent line* to the curve $x^3y^2 = 5y - 6$ at the point $(1,2)$.

3. (12 pts.) Use the definition of the derivative (that is, the secant line method) to compute $f'(x)$ for $f(x) = 3x^2 - 2x$.

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4. (10 pts.) For $y = x(2x^{-2} + 1)^2$ find the second derivative $\frac{d^2y}{dx^2}$. Be sure to simplify your answer.

5. (10 pts.) Find $f'(x)$ for

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

Be sure to simplify your answer.

6. (12 pts.) (i) Show that $f(x) = 3x - 4$ and $g(x) = \frac{x + 4}{3}$ are inverses of each other.

(ii) Find the inverse of $f(x) = 3x^{\frac{1}{2}} + 5$.

7. (10 pts.) A particle travels so that at time t its x and y coordinates are given by

$$x = 2t - 1 \quad y = 8t^2$$

Determine its velocity $\frac{dy}{dx}$ at $t = 5$ seconds.

8. (12 pts.) Suppose $y = f(x) = 4x^{1/2} + (2x - 7)^3$. In this problem we want to approximate Δy when x goes from 4 to 4.01 and then to use that to approximate $y + \Delta y = f(4.01)$.

(a) Find $\frac{dy}{dx} \Delta x$ at $x = 4$.

(b) Use your answer in (a) to approximate $y + \Delta y = f(4.01)$.

9. (12 pts.) Consider the function $f(x) = \frac{x^2 - 4}{x^2 - 3x + 2}$.

(a) Where is $f(x)$ discontinuous? Explain your answer.

(b) Does $f(x)$ have any removable discontinuities? If yes, what are they? Explain your answer.

Compute the following limits. Be sure to show your work.

(c) $\lim_{x \rightarrow 3^-} \frac{x + 2}{x^2 - 5x + 6}$

(d) $\lim_{x \rightarrow 1} \frac{x + 4}{x - 1}$