

Home Test 2
MTH 270DL01

Name _____

Semester _____

Grade _____

Please write all of your work on your own paper. Attach this to the front of your work before sending it to me. Please do the problems in order, numbered down the left side of your paper. You may write on the back of your paper in either pencil or ink (neatly please).

1) Find the derivative: $f(x) = 3x^2 - 5x$.

2) Find the derivative: $f(x) = 5\sqrt{x^3}$

3) Find the equation of the tangent line of $f(x) = 8x - 3x^2$ at the point (1,5).

4) Find the derivative using the product rule: $f(x) = (x^3 + 3)(3x^2 - 5x - 8)$.

5) Find the derivative using the quotient rule: $f(x) = \frac{x^2 - 2x + 3}{5x - 2}$

6) Find the derivative using the chain rule: $f(x) = \sqrt{4x^2 - 9}$

7) Find the derivative: $f(x) = \frac{2}{(3x^2 - 2)^5}$

8) For the function $f(x) = \frac{x+3}{2x}$ find

- a) the average rate of change from $x = 1.5$ to $x = 2.5$
- b) the instantaneous rate of change at $x = 2$.

9) The demand function for a particular commodity is given by $p = 500 - 2x$. Find the marginal revenue when $x = 30$.

10) Find the first, second, third, and fourth derivative of $f(x) = 3x^3 - 2x + \frac{1}{x}$.

11) Find the derivative implicitly of $xy^2 = 2x + 3y$.

12) Find the equation of the tangent line at $(1, -2)$ for $2x^2 + y^2 = 8x - y$

13) Take the derivative of each side with respect to time, $x^2 - y^3 = 1$, then solve for $\frac{dy}{dt}$ given $x = 3$ and $\frac{dx}{dt} = 4$.

14) A rectangle whose length is twice its width is expanding. Its width is expanding at a rate of 4 in/min. At the time that its width is 10 in., what is the rate at which its area is expanding?

15) The cost of making x shirts is $C = 150,000 + 3x$.

The revenue generated on the sale of x shirts is $R = 240x - .01x^2$.

In a particular week 300 shirts are made, and the rate at which shirts are being made every week is increasing by 20 shirts/week.

- a) Find the rate at which the cost is increasing.
- b) Find the rate at which the revenue is increasing.
- c) Find the rate at which the profit is increasing.

Home Test 3
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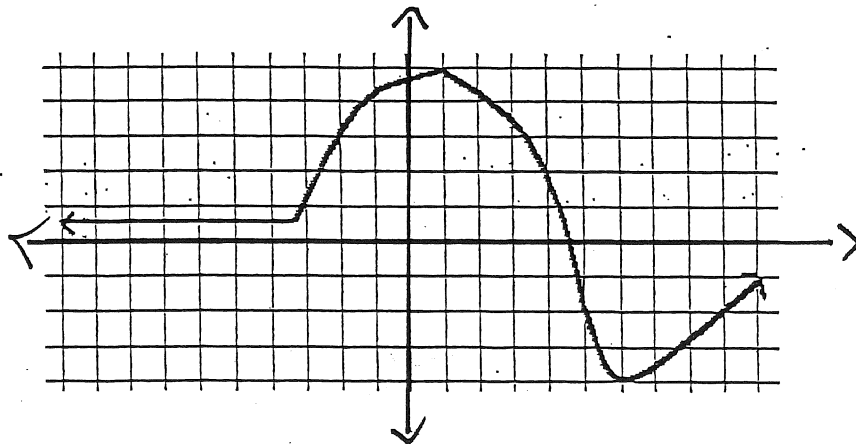
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- 1) Indicate the intervals where the function is increasing, decreasing, and constant.



- 2) Find the intervals of increasing and decreasing for $f(x) = 2x^3 - 4x^2$.

- 3) Find the local minimum and maximum points, if any, of $f(x) = 2x^3 - 15x^2 + 36x - 14$.

- 4) Find the inflection points, if any, of $f(x) = 2x^3 - 15x^2 + 36x - 14$.
Give the intervals of concavity upward and downward for $f(x)$.

- 5) Find the absolute maximum and minimum of $f(x) = 2x^3 - 15x^2 + 36x - 14$ on the interval $[0,5]$.
- 6) Sketch $f(x) = 2x^3 - 15x^2 + 36x - 14$ using the information from 3) and 4) along with any intercepts.
- 7) Given $C = .02x^3 + 55x^2 + 1250$, find the number of units, x , that produces the minimum average cost per unit, $\bar{C}$.
- 8) Find the maximum, minimum, and inflection points of $f(x) = x^4 - 18x^2 + 5$.

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1) Given $f(x) = \frac{x^2 + 2x - 3}{x^2 - 1}$ find the domain, any holes, any vertical asymptotes and the behavior near them, any horizontal or oblique asymptotes, and any x- or y-intercepts. Sketch a graph of the function.

2) $f(x) = x\sqrt{4 - x^2}$

- a) Find any intercepts
- b) Find any maximum and minimum points
- c) Find any inflection points
- d) Find the domain and range of the function.
- e) Find any asymptotes
- f) Sketch a graph of the function

3) Use differentials to approximate the change in revenue corresponding to an increase in sales from 75 to 76 units for the revenue function $R = 30x - 0.15x^2$.

4) Given the demand function $p = \frac{-1}{4}x + 200$ for the price of a collectible doll, find the revenue function. Use differentials to find the approximate change in revenue for a one-unit increase in sales when 300 dolls are sold.

5) Find the derivative of each of the following:

a) $y = e^{2x+1}$

b) $y = e^{x-x^2}$

6) Find the equation of the tangent line at $x = 1$ for $g(x) = 4 + e^{2x}$.

7) Find the derivative implicitly of $y^2 = xe^x + ye$.

8) Find the derivative of the following:

a) $y = \ln(2x+1)$

b) $y = \ln(x - x^2)$

9) Find the derivative of $y = 3^{2x+1} \ln(2x + 1)$

10) Find the derivative of $y = \frac{\ln(x+3)}{e^x}$.

11) Find the critical points and points of inflection of $f(x) = \ln(x^2 + 1)$.

12) Using the function in #11, find the slope of the tangent line to the graph of the function at the point where $x = 3$.

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1) Find the antiderivative $\int \frac{2}{(3-2x)^5} dx$

2) Find the antiderivative $\int \sqrt{3x} dx$

3) Find the antiderivative $\int \sqrt{3-4x} dx$

4) Find the antiderivatives:

a) $\int e^{-2x} dx$

b) $\int 3xe^{3x^2} dx$

c) $\int (x+1)e^{x^2+2x} dx$

5) Find the antiderivatives:

a) $\int \frac{1}{x-6} dx$

b) $\int \frac{3}{2x-5} dx$

c) $\int \frac{x}{3x^2+2} dx$

6) Evaluate the definite integrals:

a) $\int_1^3 6x^2 dx$

b) $\int_0^1 (2e^x - e^{-2x}) dx$

7) Sketch the graphs and find the area (exactly) between the graphs of

$$y = x^2 - 6x + 5 \quad \text{and} \quad y = 29 - x$$

8) Sketch the graphs and find the area (exactly) between the graphs of

$$y = 4x^3 - 8x \quad \text{and} \quad y = x$$

9) Evaluate $\int_0^2 xe^{-2x^2+1} dx$ exactly and to the nearest tenth.

10) Find the area between the x-axis and $y = \frac{3}{x+1}$ between $x = 0$ and $x = 2$ exactly and to the nearest tenth.

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1) Use integration by parts to evaluate $\int xe^{2x} dx$

2) Use integration by parts to evaluate $\int_0^1 \ln(1+2x) dx$

3) Use the tables to find $\int \sqrt{3+x^2} dx$

4) Use the tables to find $\int \frac{\sqrt{x^2-9}}{x^2} dx$

5) Find f_x and f_y for $f(x,y) = 3x^2y - 2x + y$