MATH 270 – 005 – CALCULUS I

Spring 2024

DIFFERENTIATION SKILLS TEST

Prof. Arturo Magidin

In questions 1-7, find $\frac{dy}{dx}$ by any valid method. In question 8, find $\frac{dy}{dx}$ using Logarithmic Differentiation. In questions 9 and 10, find $\frac{dy}{dx}$ by Implicit Differentiation.

Your final answer should contain no complex fractions (fractions within fractions). Easy algebraic simplifications must be done (x^2-2x^2, $\frac{x}{x}$, $\frac{2}{4}$, $\ln(e^2)$, etc), but others may be left indicated. No derivative should be left indicated in the final answer.

Each question is worth 10 points. You must score at least 70 points to pass this test, which you need to pass in order to pass the course. You may take this test as many times as needed, until you score 70 points or more; once you score 70 points or more, you cannot re-take the test.

If you get full points on a question, you should not do it again; turn in your old, graded, copy (or copies) together with any new answers. But any question where you did not get full points (even if you got 9 points) you must do again.

1. $y(x) = \dfrac{\tan(1-x)+\sec(2x)}{2x^2+3}$.

2. $y(x) = \sqrt{e^{5x} - \ln(x^2+1)}$.

3. $y(x) = \arctan(x^2-1) + \arccos(2x)$

4. $y(x) = \left(6x^{-3} - \sqrt[7]{x^3}\right)\ln(5x-e^3)$.

5. $y(x) = (10^x + x^e + \sqrt{2} + e^\pi)^{-5}$.

6. $y(x) = \tan\left(\dfrac{x}{x^2+1}\right)$.

7. $y(x) = x^3\sin^5(2x+1)\cot^3(1-x)$.

8. Use Logarithmic Differentiation to find $\frac{dy}{dx}$, where $y(x) = \dfrac{x^2\sin^3(x)}{e^x(x^2+1)^4}$.

9. Use implicit differentiation to find $\frac{dy}{dx}$, where $y^5 + x^2y^3 = 1 + ye^{x^2}$.

10. Use implicit differentiation to find $\frac{dy}{dx}$, where $\arctan(x^2y) = xy^2$.