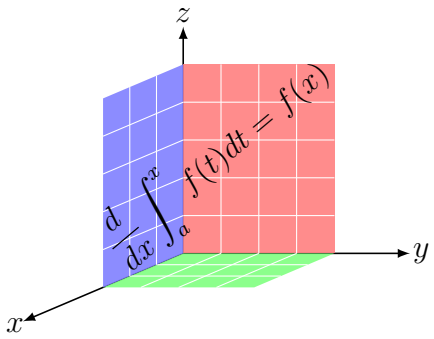


MATH121 MATHEMATICAL ANALYSIS-I
SAMPLE MIDTERM EXAM 2

August 18, 2017

Name: _____ **Be sure to show your work!**

1 Find the limit $\lim_{x\to 0} \dfrac{\ln(1+x) - 2x^2}{e^x - 1 - 2x^2}$

2 Find $\dfrac{dy}{dx}$ if $y = e^{\sin x} \tan x$

3 Let $f(x) = \dfrac{2 + \ln x^2}{x}$.

1. Find the open interval(s) on which f is increasing, and the open interval(s) on which f is decreasing.
2. Find all the critical points of f and determine if they are maximum or minimum points

4 Let $y = \dfrac{\cos \pi\sqrt{x}}{1 + x^2}$. Find the slope of the tangent line to the graph at the point $(x, y) = (1, -1/2)$.

5 Evaluate $\displaystyle\int_0^1 \frac{e^x}{e^x + 1} dx$

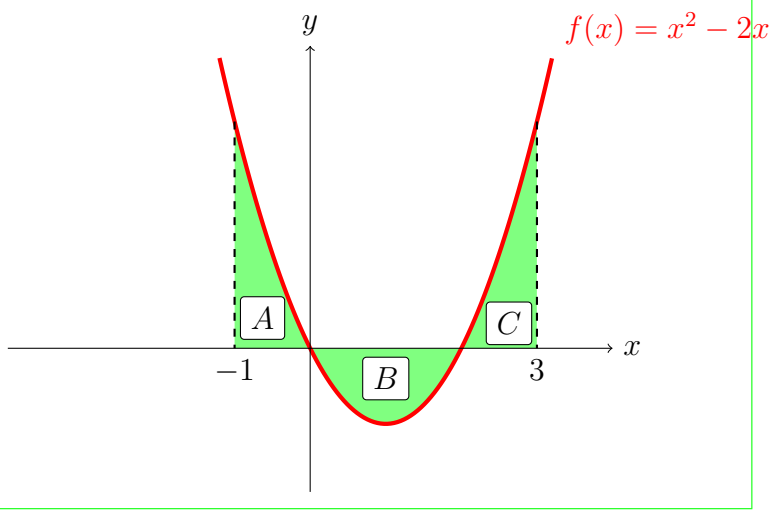
6 Let A be the area of the region in the xy-plane bounded by the curves $y = 1$ and $y = \ln x$ on the interval $1 \le x \le e$.

1. Write down two integrals, one with respect to x and one with respect to y, that both give the value of A.
2. Find the value of A

7 Find $\int e^x \cos x dx$

8

The graphs of functions f is shown at right. Evaluate $\int_{-1}^{3}(x^2-2x)dx$ and interpret the result in terms of areas (A, B, C).



9 Compute $\lim_{x\to 0}\dfrac{\int_0^x \cos t^2 dt}{x}$.

10

1. State the Mean Value Theorem for Derivatives
2. Find all possible values c satisfying the conclusion of the Mean Value Theorem for $f(x) = x^3+x^2-x+2$ on the interval $[0,\ 1]$.

11 Find the area between the graphs of $y = 4x$ and $y = x^3$ over the interval $[-2, 2]$