Summer Term I — MA124 Calculus II

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Practice Exam II

student:

Problem 1: Evaluate the integrals

$$\int_0^{\pi/2} \sin(x)e^{\cos(x)}\,dx$$

$$\int_0^1 xe^{3x^2}\,dx$$

$$\int x^2e^{2x}\,dx$$

Problem 2: Sketch the region bounded by the curves

$$y = x^2 + 2x + 6\ , \quad y = 2x + 1.$$

Label the curves and determine any points of intersection. Find the volume of the solid obtained by rotating this region about the x-axis.
Find the volume of the solid obtained by rotating this region about the y-axis.

Problem 3: Solve the differential equations:

$y' = y$

$y' = xy$

$xyy' = 1$

Problem 4: Find a solution of the differential equation that satisfies the given initial condition:
$y' = x + 2 \quad y(1) = 5$

$y' = y \quad y(0) = \pi$

$y' = xy + 2y \quad y(0) = 2$

$4yy' = e^{2x} \quad y(0) = \sqrt[4]{2}$

Problem 5: Similar to one of the exercises $8, 9, 10$ on page 538, or exercises $11, 12, 13$ on page 558.

Problem 6: Give examples sequences satisfying the following conditions:

Give an example of a divergent sequence.

Give an example of nonconstant sequence converging to 5.

Give an example of a strictly decreasing sequence which converges to π.

Give an example of a nonconstant sequence that converges to 1, and is neither decreasing, nor increasing.

Give an example of a divergent bounded sequence.

Give an example of a convergent sequence which has among its terms the numbers -2 and 1.

Problem 7: For each of the following sequences/series, decide whether it is divergent or convergent, and if it convergent, find its limit.

Problem 8: Convergent/Divergent Series Testing, radius and interval of convergence of power series.

Problem 9: Application of power series, representation of function as a power series, McLoren and Taylor series

Problem 10: State the Fundamental Theorem of Calculus, the definition of convergent sequence with limit 3, the Integral test for convergence.