

2 **Math 141.** Spring'00 (Professor Kanovich), Mid-term 2

Name (print): _____

Signature: _____

Use separate sheets for your solutions of the problems.
 Give detailed explanations, as if your solution were going to be published.
No explanations, no credit (even if you have guessed the correct answer).
 Staple the pages together. Write neatly and organize your pages so that we can read them.

Problem 1 (10 points)

Find a power series solution for the differential equation: $y' + y = x + 1$,
 with the initial condition $y(0) = 1$.

Also find a simple expression for the solution $y(x)$ that you get.

- (a) e^{-x} (b) $x + e^{-x}$ (c) $x + e^x$ (d) none of the above.

Problem 2 (10 points)

Use power series to evaluate: $\lim_{x \rightarrow 0} \frac{\sqrt[3]{1+x} - \sqrt[3]{1-x}}{x}$.

- (a) 0 (b) 1/2 (c) 2/3 (d) 1 (e) none of the above.

Problem 3 (10 points)

Use power series to evaluate: $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2}$.

- (a) 0 (b) 1/2 (c) 2/3 (d) 1 (e) none of the above.

Problem 4 (10 points)

How many non-zero terms of the Maclaurin series of $\cos x$ must you use in order to calculate:

$$\int_0^1 \cos(\sqrt{t}) dt$$

with an error less than 0.01 ?

- (a) 1 (b) 2 (c) 3 (d) 4 (e) 5 (f) more .

Problem 5 (10 points)

Use vectors to find the angle between the (main) diagonals of a cube.

- (a) $\pi/3$ (b) $\pi/2$ (c) $2\pi/3$ (d) none of the above.

Problem 6 (10 points)

Find the area of the quadrilateral in the plane with vertices

$(1, 1)$, $(4, 5)$, $(5, 4)$, and $(8, 8)$.

Is this quadrilateral a parallelogram ?

- (a) 5 (b) 6 (c) 7 (d) 8 (e) none of the above.

Problem 7 (10 points)

Find the distance from the point $(1, 0, 1)$ to the line, which passes through the points:

$(1, 1, 0)$ and $(0, 1, 1)$.

- (a) $\frac{\sqrt{2}}{2}$ (b) $\frac{2\sqrt{2}}{3}$ (c) $\sqrt{\frac{2}{3}}$ (d) $\sqrt{\frac{3}{2}}$ (e) none of the above.

Problem 8 (10 points)

Find the distance from the point $(1, 0, 1)$ to the plane, which passes through the points:

$(0, 0, 0)$, $(1, 1, 0)$, and $(0, 1, 1)$.

- (a) $\frac{\sqrt{2}}{2}$ (b) $\frac{2\sqrt{2}}{3}$ (c) $\sqrt{\frac{2}{3}}$ (d) $\sqrt{\frac{3}{2}}$ (e) none of the above.

Problem 9 (10 points)

Find the angle between the planes:

$2x + y - z = 2$ and $x + 2y + 4z = 5$.

- (a) $\pi/6$ (b) $\pi/3$ (c) $\pi/2$ (d) none of the above.

Problem 10 (10 points)

Find parametric equations for the line of intersection of the planes:

$2x + y - z = 2$ and $x + 2y + 4z = 5$.