BINUS University

Academic Career: ***Undergraduate / ~~Master / Doctoral~~ *)***		**Class Program:** ***International/Regular/~~Smart Program/Global Class~~*)***	
☐ **Mid Exam** ☐ **Short Term Exam** ☐ **Others Exam :** _____	■ **Final Exam**	**Term : ~~Odd~~/Even/~~Short~~ *)**	
■ **Kemanggisan** ■ **Alam Sutera** ☐ **Bekasi** ☐ **Senayan** ☐ **Bandung** ☐ **Malang**		**Academic Year :** **2020 / 2021**	
Faculty / Dept. : /		Deadline	Day / Date : Friday, July 30, 2021 Time : 17:00:00
Code - Course : MATH6031 - Calculus		Class :	
Lecturer : Team		Exam Type :	Online
*) *Strikethrough the unnecessary items*			
The penalty for CHEATING is DROP OUT!!!			

GUIDANCE

- The exam consists of **two parts**, there are **Essay** (30%) and **Multiple Choice** (70%).
- This is a guideline to Multiple Choice Question (Read it carefully before you start the exam)

1. Prepare stationery (paper and pencil) and calculation tools.
2. **The following is the link for multiple choice exam: https://socs1.binus.ac.id/tcexam**
3. Login with the username and password that you use to login to Binusmaya. Username: [email@binus.ac.id] and password: [binusmaya password]. Then **click on the login button**.
4. Choose the course and then **click on the execute button**.
5. Each course has a start and end date for the course exam. The exam can be done at that time interval. Once you start the multiple choice exam, you will have the total of 100 minutes to do it. The working time cannot be stopped or postponed if the test is started. So, make sure you are ready to take the exam.
6. After selecting the course, enter **the test password: MATH6031** then **click on the authenticate button.**
7. There are 30 questions. Every question has the same points. There is no points reduction if your answer is wrong.
8. Each question has 4 choices. There is only 1 correct answer. Choose the answer that you think is right by clicking on the option.
9. To move to the next question, **click on the next button** and to move to the previous question, **click on the previous button**.
10. If you are sure with your answer, then **click on the confirm button** and the answer cannot be changed anymore.
11. If you have answered all questions, then **click on the terminate the exam button**.

Verified by,

D5556 - Faisal and sent to Department/Program on June 19, 2021

Instruksi Pengerjaan Soal Essay

• Setiap mahasiswa hanya mengerjakan **2 soal essay saja (1 soal dari topic A dan 1 soal dari Topic B)**

• Siapkan NIM anda, lalu hitung berapakah nilai dari **(NIM mod 10)** Anda?

• Misalkan **NIM mod 10 = X**, maka anda mengerjakan soal **Topik A dan B masing-masing nomor X.**

Contoh:

NIM = 20107005

NIM mod 10 = 20107005 mod 10 = 5, maka mahasiswa dengan NIM 20107005 akan mengerjakan soal essay no 5 di topik A dan nomor 5 di topik B

• Note: P mod Q = R dapat diartikan bahwa R adalah bilangan bulat tak negatif sisa pembagian *P* oleh *Q*.

INSTRUCTIONS

•Each student only does 2 essay questions (1 essay from topic A and 1 essay from Topic B)

• Prepare your NIM, then calculate what is the value of **(NIM mod 10)**

• If **NIM mod 10 = X**, then you work on question X for both **Topic A and B.**

Example:

NIM = 20107005

NIM mod 10 = 20107005 mod 10 = 5, the student with NIM 20107005 will do the questions essay no 5 on topic A and number 5 on topic B

• Note:

P mod Q = R can be interpreted as the non-negative integer R which is the remainder of P divide by Q.

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Topik A

0. Gambarkan daerah antara kurva $y = x^2 + 1$ dan dan garis y = 5, kemudian hitung volume benda putar akibat perputaran daerah tersebut yang diputar terhadap sumbu-x.
   Sketch the area bounded by the function $y = x^2 + 1$ and the line y = 5, and then calculate the volume of the solid obtained by rotating the area around x-axis.

1. Gambarkan daerah antara kurva $y = x^2 + 1$ dan dan garis y = 2, kemudian hitung volume benda putar akibat perputaran daerah tersebut yang diputar terhadap garis $y = 6$.
   Sketch the area bounded by the function $y = x^2 + 1$ and the line y = 2, and then calculate the volume of the solid obtained by rotating the area around the line $y = 6$.

2. Tentukan volume benda putar dari daerah yang dibatasi oleh sumbu-x, sumbu-y dan kurva $y = 4 - x^2$, perputaran terhadap sumbu *y* satu lingkaran penuh (360^o).
   Calculate the volume of the solid obtained by rotating the region bounded by x-axis, y-axis and the parabola $y = 4 - x^2$around the y-axis.

3. Misalkan *A* adalah daerah yang dibatasi oleh grafik-grafik $y = x^2 - 4x + 6$ dan $y = 4x - x^2$. Tentukan volume benda putar dari daerah *A* jika diputar mengelilingi sumbu-x.
   Let A be the region bounded by two parabolas $y = x^2 - 4x + 6$ and $y = 4x - x^2$. Find the volume of the solid obtained by rotating the region A around the x-axis.

4. Tentukan volume benda putar yang terjadi apabila daerah yang dibatasi kurva $y = x^2$, garis $y = -2$, dari $x = 0$ sampai $x = 2$ diputar 360^o terhadap garis $y = -2$.
   Calculate the volume of the solid obtained by rotating the region bounded by the function $y = x^2$, the line $y = -2$, from $x = 0$ to $x = 2$ around the line $y = -2$.

5. Perhatikan gambar di bawah ini. Suatu wadah berbentuk bola dengan jari-jari r, diisi dengan air sampai ketinggian H. Gunakanlah prinsip volume benda putar, untuk menentukan volume air yang berada pada bola tersebut.
   Hint: Volume bola yang utuh dapat diperoleh dengan cara memutarkan lingkaran $x^2 + y^2 = r^2$ sejauh 2π terhadap sumbu putar yang melalui titik pusat lingkaran.

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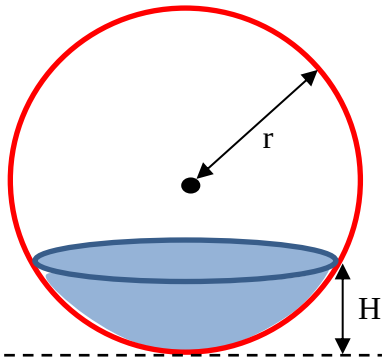
Look at the picture below. A spherical container of radius r is filled with water to a height H. Use the principle of the volume of a solid of revolution, to determine the volume of water in the ball.

***Hint**: The volume of the spherical can be obtained by rotating the circle $x^2 + y^2 = r^2$ about the axis of rotation through the center of the circle.*



6. Tentukan volume benda putar yang terbentuk oleh daerah yang dibentuk segitiga dengan titik sudutnya adalah A(0,0), B(4,4) dan C(6,2) diputar mengelilingi sumbu-x.
   Find the volume of the solid obtained by rotating the triangle with the vertices A(0,0), B(4,4) and C(6,2) around x-axis.

7. Tentukan volume benda putar yang terbentuk oleh daerah yang dibentuk segitiga dengan titik sudutnya adalah A(0,0), B(4,4) dan C(6,2) diputar mengelilingi sumbu-y.
   Find the volume of the solid obtained by rotating the triangle with the vertices A(0,0), B(4,4) and C(6,2) around y-axis.

8. Carilah volume benda putar yang terbentuk dari pemutaran daerah yang dibatasi oleh kurva $y = x^3$, sumbu y , dan garis y = 3 mengelilingi sumbu-y, serta gambarkan daerahnya.
   Calculate the volume of the solid obtained by rotating the region bounded by the function $y = x^3$, y-axis, and the line y = 3 around y-axis, and sketch the area.

9. Sebuah volume benda putar yang diputar pada sumbu-x mempunyai nilai $\frac{9}{10}\pi$ satuan volume yang terbentuk dari dua fungsi $f(x) = 3x - ax^2$ dan $g(x) = bx^2 + c$ dengan titik potong pada $x = 0$ dan $x = 1$. Tentukan nilai a pada fungsi $f(x)$ dan b dan c pada fungsi $g(x)$.

The volume of the solid obtained by rotating the region bounded by two functions $f(x) = 3x - ax^2$ *dan* $g(x) = bx^2 + c$ *around x-axis is* $\frac{9}{10}\pi$. *Two functions* f *and* g *intersect at* $x = 0$ *and* $x = 1$. *Find the value of* a *for* $f(x)$ *and* b, c *for* $g(x)$.

Topik B

0. Tentukan jari-jari konvergensi dan interval konvergensi deret pangkat berikut.
   Find the radius of convergence and the interval of convergence for the power series

$$\frac{1}{4} + \frac{(x+3)}{5} + \frac{(x+3)^2}{6} + \cdots$$

1. Tentukan jari-jari konvergensi dan interval konvergensi deret pangkat berikut.
   Find the radius of convergence and the interval of convergence for the power series

$$\frac{x}{2} + \frac{x^2}{8} + \frac{x^3}{24} + \frac{x^4}{64} + \frac{x^5}{160} + \cdots$$

2. Misalkan/*Let*

$$g(x) = 1 + 2x + x^2 + 2x^3 + x^4 + \cdots$$

   dengan koefisien-koefisien adalah $c_{2n} = 1$ dan $c_{2n+1} = 2$ untuk $n \geq 0$. Jika interval konvergensi dari deret tersebut adalah (a,b), maka tentukan $a^2 + b^2 + ab$.
   with coefficients are $c_{2n} = 1$ *and* $c_{2n+1} = 2$ *for* $n \geq 0$. *If the interval convergence of the power series is (a,b), then determine* $a^2 + b^2 + ab$.

3. Tentukan jari-jari konvergensi dan interval konvergensi deret pangkat berikut.
   Find the radius of convergence and the interval of convergence for the power series

$$\frac{(x-3)}{1 \cdot 3} + \frac{(x-3)^2}{2 \cdot 3^2} + \frac{(x-3)^3}{3 \cdot 3^3} + \frac{(x-3)^4}{4 \cdot 3^4} + \cdots$$

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4. Tentukan jari-jari konvergensi dan interval konvergensi deret pangkat berikut.
   Find the radius of convergence and the interval of convergence for the power series

$$1-\frac{1}{3}\left(\frac{x-1}{x+3}\right)+\frac{1}{9}\left(\frac{x-1}{x+3}\right)^2-\frac{1}{27}\left(\frac{x-1}{x+3}\right)^3+\cdots$$

5. Tentukan jari-jari konvergensi dan interval konvergensi deret pangkat berikut.
   Find the radius of convergence and the interval of convergence for the power series

$$\frac{1}{2}x+\frac{1}{2}x^2+\frac{3}{8}x^3+\frac{1}{4}x^4+\cdots$$

6. Tentukan jari-jari konvergensi dan interval konvergensi deret pangkat berikut.
   Find the radius of convergence and the interval of convergence for the power series

$$\frac{3}{2}-3(x-5)+\frac{27}{4}(x-5)^2-\cdots$$

7. Tentukan jari-jari konvergensi dan interval konvergensi deret pangkat berikut.
   Find the radius of convergence and the interval of convergence for the power series

$$2(4x-8)+2(4x-8)^2+\frac{8}{3}(4x-8)^3+\cdots$$

8. Tentukan jari-jari konvergensi dan interval konvergensi deret pangkat berikut.
   Find the radius of convergence and the interval of convergence for the power series

$$(x-2)+\frac{2}{5}(x-2)^2+\frac{3}{25}(x-2)^3+\cdots$$

9. Tentukan jari-jari konvergensi dan interval konvergensi deret pangkat berikut.
   Find the radius of convergence and the interval of convergence for the power series

$$\frac{1}{3}-\frac{(4x-12)}{54}+\frac{(4x-12)^2}{405}-\frac{(4x-12)^3}{2430}+\cdots$$

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