UJIAN AKHIR SEMESTER MA1103 MATEMATIKA BISNIS
SENIN, 22 DESEMBER 2025,
WAKTU 110 MENIT

Capaian Pembelajaran Mata Kuliah:

[CPMK 1] Memiliki keterampilan teknis baku yang didukung konsep/rumus yang sesuai
[CPMK 2] Menelaah dan menyajikan informasi secara simbolik, diagram, tabel, atau grafik
[CPMK 3] Mampu mengkomunikasikan hasil pemikiran secara lisan maupun tulisan
[CPMK 4] Menggunakan matematika untuk menyelesaikan problem di bidang ekonomi dan bisnis

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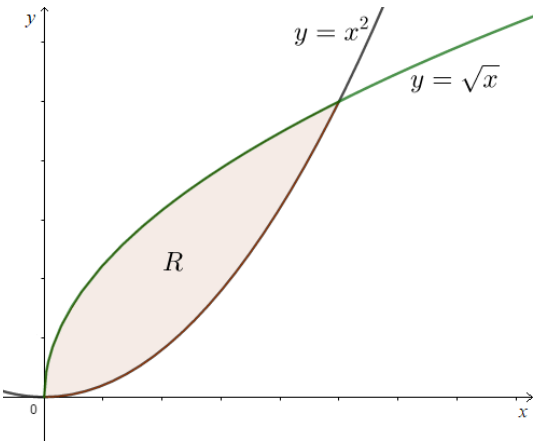
*Dilarang menggunakan kalkulator dan alat hitung lainnya. Ujian ini terdiri dari **dua** bagian: A (7 soal uraian singkat, dengan nilai maksimum tiap soal 3) dan B (3 soal uraian panjang, dengan maksimum tiap soal 8)*

Bagian A

1. **(CPMK 1)** Tentukan semua x yang memenuhi persamaan $\left(\frac{1}{3}\right)^{1-x^2} = 27$.
2. **(CPMK 1)** Misalkan $f(x) = \ln(2x+1)$. Tentukan $f(0)$, $f'(x)$, dan $f'(0)$.
3. **(CPMK 1)** Tentukan solusi khusus persamaan diferensial $\frac{dy}{dx} = x^2 + 2x$ apabila $y = 0$ saat $x = -1$.
4. **(CPMK 1)** Gunakan metode substitusi untuk menentukan $\int (3x+1)\sqrt{3x^2+2x+5}\, dx$
5. **(CPMK 1)** Misalkan $f(x)$ dan $g(x)$ kontinu pada interval $0 \le x \le 5$. Apabila $\int_0^2 f(x)\, dx = 3$, $\int_2^3 f(x)\, dx = 2$, $\int_0^5 g(x)\, dx = 5$, dan $\int_3^5 g(x)\, dx = 1$, tentukan $\int_0^3 f(x) + 2g(x)\, dx$.
6. **(CPMK 4)** Diketahui kurva Lorentz untuk distribusi pendapatan para guru di suatu provinsi memenuhi $L(x) = 0,3x^2 + 0,7x$.
   (a) Tentukan Indeks Gini $GI = 2\int_0^1 (x - L(x))\, dx$ dari distribusi pendapatan para guru di provinsi tersebut.
   (b) Jika Indeks Gini untuk petani di provinsi yang sama adalah $0,15$, apa yang dapat disimpulkan mengenai distribusi pendapatan dari kedua pekerjaan di provinsi tersebut? Jelaskan.
7. **(CPMK 2)** Daerah tertutup R di gambar berikut dibatasi oleh $y = x^2$ dan $y = \sqrt{x}$. Tentukan titik potong kedua kurva dan luas daerah R.



Bagian B ... halaman berikutnya

UJIAN AKHIR SEMESTER MA1103 MATEMATIKA BISNIS
SENIN, 22 DESEMBER 2025,
WAKTU 110 MENIT

Capaian Pembelajaran Mata Kuliah:

[CPMK 1] Memiliki keterampilan teknis baku yang didukung konsep/rumus yang sesuai
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Bagian B

1. **(CPMK 3)** Nilai sebuah mesin industri setelah t tahun diberikan oleh

$$Q(t) = 15.000e^{-0,3t}.$$

   (a) Tentukan laju perubahan nilai mesin setelah 4 tahun?

   (b) Tentukan fungsi laju persentase perubahan nilai mesin $RQ(t) = \dfrac{Q'(t)}{Q(t)}$.

   (c) Tentukan laju persentase perubahan nilai mesin setelah 4 tahun.

   (d) Berapakah laju persentase perubahan nilai mesin apabila mesin dapat digunakan selamanya?

2. **(CPMK 4)** Fungsi permintaan dan suplai untuk sejumlah q unit diberikan sebagai berikut:

$$D(q) = 65 - q^2, \quad S(q) = q^2 + 2q - 47.$$

   Setiap q unit dari suatu komoditas akan dijual dengan harga satuan $p = D(q)$ dolar per unit, sedangkan q unit dari komoditas tersebut disuplai oleh produsen dengan harga $p = S(q)$ dolar per unit.

   (a) Tentukan harga ekuilibrium, p_e (ketika suplai sama dengan tingkat penjualannya).

   (b) Tentukan surplus konsumen $CS = \displaystyle\int_0^{q_0} D(q)\ dq - p_0 q_0$ dan surplus produsen $PS = p_0 q_0 - \displaystyle\int_0^{q_0} S(q)\ dq$ pada ekuilibriumnya.

3. **(CPMK 3)** Pemilik apartemen memperkirakan, setelah t tahun akan mendapatkan keuntungan dengan laju $80 + t$ ribu dolar per tahun. Asumsikan suku bunga tahunan konstan 5% dan dibungakan secara kontinu.

   (a) Gunakan integral parsial untuk menentukan $\int (80 + t)e^{-0,05t}\ dt$

   (b) Jika apartemen digunakan 10 tahun, tentukan *present value* dari keuntungan apartemen.

   (c) Jika apartemen dapat digunakan tanpa batas waktu, tentukan *present value* dari keuntungan apartemen. (Catatan: $\lim\limits_{x\to\infty} \dfrac{x}{e^{0,05x}} = 0$)

Bagian A ... halaman sebelumnya

FINAL EXAM MA1103 MATHEMATICS FOR BUSINESS
MONDAY, 22 DECEMBER 2025,
TIME 110 MINUTES

Course Outcomes:

[CO 1] To have standard technical skills supported by concepts and formulas.
[CO 2] To have ability to provide mathematical models, diagrams, tables, or graphs
[CO 3] To have ability to communicate the results of thoughts and work both orally and in writing
[CO 4] To utilize mathematical concepts in real life problems of business and economics

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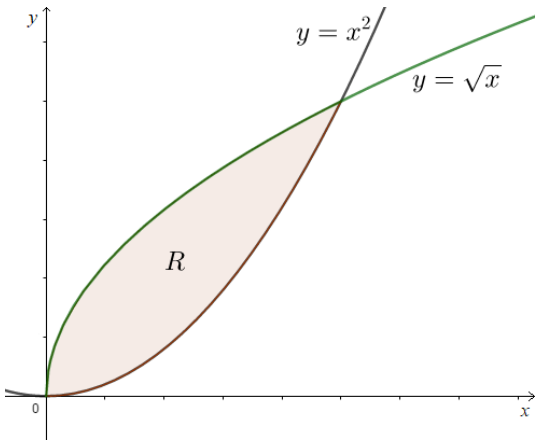
*Calculator and any gadgets are prohibited. This exam consists of **two** parts: A (7 short essay questions, maximum 3 points for each question) dan B (3 long essay questions, maximum 8 points for each question)*

Part A

1. **(CO 1)** Find all real numbers x that satisfy $\left(\frac{1}{3}\right)^{1-x^2} = 27$.
2. **(CO 1)** Let $f(x) = \ln(2x+1)$. Determine $f(0)$, $f'(x)$, and $f'(0)$.
3. **(CO 1)** Determine the particular solution of the differential equation $\frac{dy}{dx} = x^2 + 2x$ where $y = 0$ if $x = -1$.
4. **(CO 1)** Use substitution method to determine $\int (3x+1)\sqrt{3x^2+2x+5}\, dx$
5. **(CO 1)** Let $f(x)$ and $g(x)$ continue on the interval $0 \le x \le 5$. If $\int_0^2 f(x)\, dx = 3$, $\int_2^3 f(x)\, dx = 2$, $\int_0^5 g(x)\, dx = 5$, and $\int_3^5 g(x)\, dx = 1$, calculate $\int_0^3 f(x) + 2g(x)\, dx$.
6. **(CO 4)** The Lorentz curves for the distribution of income for teachers in a certain province is given by $L(x) = 0,3x^2 + 0,7x$.
   (a) Find the Gini Index $GI = 2\int_0^1 (x - L(x))\, dx$ for the distribution of income for teachers.
   (b) If the Gini Index for the distribution of income for farmers in the same province is $0,15$ what can be concluded for the distibution of income between two of them?
7. **(CO 2)** The closed region R in the following figure is bounded by $y = x^2$ and $y = \sqrt{x}$. Find the intersection points between two curves and determine area of the closed region R.



Part B ... next page

FINAL EXAM MA1103 MATHEMATICS FOR BUSINESS
MONDAY, 22 DECEMBER 2025,
TIME 110 MINUTES

Course Outcomes:

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Part B

1. **(CO 3)** Suppose a company utilizes a machine to manufacture its product. The value of the machine after t years is given by
$$Q(t) = 15.000e^{-0,3t}.$$
   (a) At what rate is the value of the machine changing after 4 years?
   (b) Determine $RQ(t) = \dfrac{Q'(t)}{Q(t)}$, that is the percentage rate of $Q(t)$.
   (c) At what percentage rate is the value of the machine changing after 4 years?
   (d) At what percentage rate of $Q(t)$ if the machine can be used as long as possible?

2. **(CO 4)** The demand and supply functions of q units particular product are given by
$$D(q) = 65 - q^2, \quad S(q) = q^2 + 2q - 47.$$
   respectively. Every product will be sold with the price $p = D(q)$ dollars, and producers will supply the product with the price $p = S(q)$ dollars per unit.
   (a) Find the equilibrium price p_e (when supply equals demand).
   (b) Determine the consumers surplus $CS = \displaystyle\int_0^{q_0} D(q)\ dq - p_0 q_0$
   and the producers surplus $PS = p_0 q_0 - \displaystyle\int_0^{q_0} S(q)\ dq$ at the equilibrium price.

3. **(CO 3)** It is estimated that t years from now an apartment will be generating profit for its owner at the rate of $80 + t$ thousand dollars per year. Assume that the annual interest rate remains fixed at 5% compounded continuously.
   (a) Use integration by parts to determine $\int (80 + t)e^{-0,05t}\ dt$
   (b) Find the present value of the apartment if it will be used 10 years.
   (c) Find the present value of the apartment if it will be used as long as possible. (Note: $\lim\limits_{x\to\infty} \dfrac{x}{e^{0,05x}} = 0$)

Part A ... previous page