



KEY

ÇANKAYA UNIVERSITY

Department of Mathematics and Computer Science

MCS 108 - Calculus for Business and Economics II

FIRST MIDTERM EXAMINATION

21.07.2016

**STUDENT NUMBER:**

**NAME-SURNAME:**

**SIGNATURE:**

**INSTRUCTOR:**

**DURATION:** 100 minutes

Question	Grade	Out of
1		20
2		18
3		24
4		16
5		25
Total		103

**IMPORTANT NOTES:**

- 1) Please make sure that you have written your student number and name above.
- 2) Check that the exam paper contains 5 problems.
- 3) Show all your work. No points will be given to correct answers without reasonable work.

1) Evaluate.

$$\text{a) (4 pnt) } \int \left( 2x^6 - x\sqrt{x} + \frac{1}{x^3} - 5 \right) dx = \frac{2x^7}{7} - \frac{x^{5/2}}{5/2} + \frac{x^{-2}}{-2} - 5x + C$$

$$\begin{aligned} \text{b) (4 pnt) } \int \frac{3x^5 + \sqrt{x} + 1}{x} dx &= \int \left( \frac{3x^5}{x} + \frac{\sqrt{x}}{x} + \frac{1}{x} \right) dx \\ &= \int \left( 3x^4 + x^{-1/2} + \frac{1}{x} \right) dx \\ &= \frac{3x^5}{5} + \frac{x^{1/2}}{1/2} + \ln|x| + C \end{aligned}$$

$$\begin{aligned} \text{c) (6 pnt) } \int_1^2 (2x-1)(x^2-1) dx &= \int_1^2 (2x^3 - 2x - x^2 + 1) dx \\ &= \left[ \frac{2x^4}{4} - \frac{2x^2}{2} - \frac{x^3}{3} + x \right]_1^2 \end{aligned}$$

$$= \left[ 8 - 4 - \frac{8}{3} + 2 \right] - \left[ \frac{1}{2} - 1 - \frac{1}{3} + 1 \right] = 6 - \frac{8}{3} - \frac{1}{6} = \frac{19}{6}$$

$$\text{d) (6 pnt) } \int \frac{2x+3}{(x^2+3x+1)^3} dx = \int \frac{du}{u^3} = \int u^{-3} du = \frac{u^{-2}}{-2} + C$$

$$u = x^2 + 3x + 1$$

$$du = (2x+3) dx$$

$$= \frac{(x^2+3x+1)^{-2}}{-2} + C$$

2) Evaluate.

$$\text{a) (6 pnt) } \int e^{2x^3+x^2} (3x^2+x) dx = \int e^u \frac{du}{2} = \frac{e^u}{2} + C = e^{\frac{2x^3+x^2}{2}} + C$$

$$u = 2x^3 + x^2$$

$$du = (6x^2 + 2x) dx$$

$$\frac{du}{2} = (3x^2 + x) dx$$

$$\text{b) (6 pnt) } \int x \sqrt{x^2+5} dx = \int \sqrt{u} \frac{du}{2} = \frac{u^{3/2}}{\frac{3}{2}} \cdot \frac{1}{2} + C$$

$$u = x^2 + 5$$

$$du = 2x dx$$

$$= \frac{(x^2+5)^{3/2}}{3} + C$$

$$\text{c) (6 pnt) } \int x e^x dx$$

$$u = x \quad du = dx$$

$$dv = e^x dx \quad v = e^x$$

$$\int u dv = uv - \int v du$$

$$\int x e^x = x e^x - \int e^x dx$$

$$= x e^x - e^x + C$$

