

Prince Sultan university
Department of Mathematics
Major III Exam
Semester II ,2007-2008 Spring(072)
26.04.2008
Math 113-Calculus II

Time Allowed: 90 minutes

Name:

ID Number:

Instructions:

1. Answer all the questions.
2. Show your work in the spaces provided for each question.

Question	Q.1	Q.2	Q.3	Q.4	Total
Grade					

Question 1.

a) (10 pts.) Show that $\lim_{x \rightarrow 0} (1 + 2x)^{\frac{1}{x}} = \frac{1}{e^2}$.

b) (15 pts.) Evaluate the followings:

i. $\lim_{x \rightarrow \infty} \frac{e^{3x}}{x^2}$.

ii. $\int_{-\sqrt{2}}^{-2/\sqrt{3}} \frac{dx}{x\sqrt{x^2 - 1}}$.

iii. $\int_1^2 \frac{dx}{\sqrt{x}\sqrt{4-x}}$.

Question 2. A) (10 pts.) Find $\frac{dy}{dx}$ of

i. $y = \sinh^{-1}\left(\frac{1}{3}x\right).$

ii. $y = (1 + x \operatorname{csch}^{-1}x)^{10}.$

B) (15 pts.) Evaluate the integrals

a) $\int \sinh^6 x \cosh x dx.$

b) $\int \frac{dx}{\sqrt{1+9x^2}}.$

c) $\int \coth^2 x \operatorname{csch}^2 x dx.$

Question 3. A) (15 pts.) Evaluate integrals:

i. $\int \frac{e^x}{\sqrt{4 + e^{2x}}} dx.$

ii. $\int \frac{dx}{\sqrt{x} 3^{\sqrt{x}}}.$

iii. $\int_0^{\pi} (x + x \cos x) dx.$

B) (10 pts.) Evaluate the integral $\int_0^1 \frac{x^3}{\sqrt{x^2 + 1}} dx$ using the substitution $u = \sqrt{x^2 + 1}.$

Question 4. (6+7+7 pts.) Evaluate the integrals:

i. $\int \tan^3 x \sec^5 x dx.$

ii. $\int \sin 3x \cos 2x dx.$

iii. $\int \sin^3 x \cos^2 x dx.$