# M ETU <br> Department of Mathematics 

| Calculus with Analytic Geometry <br> Midterm II |  |  |  |
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| Code Acad. Year Semester | : Math 119 <br> : 2009-2010 <br> : Spring | Last Name <br> Name <br> Department <br> Signature | Student No. Section |
| Date <br> Time Duration | : May 22nd 2010 <br> : 13:30 <br> : 100 minutes | 7 QUESTIONS ON 4 PAGES TOTAL 60 POINTS |  |
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## SHOW DETAILED WORK IN EVERY PROBLEM.

Question 1. ( 12 pts.) Find the following limits.
(a) $\lim _{x \rightarrow 5} \frac{\sqrt[3]{x}-\sqrt[3]{5}}{\sqrt{x}-\sqrt{5}}$
(b) $\lim _{x \rightarrow 0}\left(\frac{1}{\arctan x}-\frac{1}{x}\right)$
(c) $\lim _{x \rightarrow \infty} x^{\frac{1}{x}}$

Question 2. (4 pts.)Let $\mathrm{F}(\mathrm{t})$ denote the amount of money in a bank after t years. Assume that the growth rate of $F(t)$ is proportional to itself and the initial amount of the money is 1000 TL . If the increase in $F(t)$ after one year is function $F(t)$.

Question 3. (5 pts.) Find the area of region bounded by curves $y=\ln (x+2), y=2 \ln x$ and $y=0$.

Question 4. ( $\mathbf{9}$ pts.) Sketch the region R bounded by $2 y=x^{2}, 2 x+2 y-3=0$, and express the volume as an integral (do not evaluate the integral) for the solid
(a) obtained by revolving R around the line $y+1=0$
(b) obtained by revolving R around the line $x=2$, using the method of cylindrical shell.

Question 5. (12 pts.) (a) Prove that the function $f(x)=e^{2 x+1}-1$ is invertible. Find $f^{-1}(x)$ and its domain.
(b) Find the domain and range of function $g(x)=\arctan (3 x+2)+1$ (recall that arctan is the inverse to the tangent function).
(c) Let $F$ denote the inverse function for $2 \sinh (x+1)$. Find $F(0)$ and $F^{\prime}(0)$. (Recall that sinh is the hyperbolic sine function).

Question 6. (3 pts.) Calculate the integral $\int_{1}^{e} \ln ^{2}(x) d x$.

Question 7. (15 pts.) Find the following integrals
(a) $\int \frac{d x}{\sqrt{x}-\sqrt[4]{x}+1}$
(b) $\int \tan ^{3} x \sec x d x$
(c) $\int \frac{\sin ^{3} x}{\sqrt{\cos x}} d x$
(d) $\int \frac{6-5 x}{x^{3}-5 x^{2}+6 x} d x$
(e) $\int \frac{d x}{\sqrt{2-(1+2 x)^{2}}}$

