MA2160 Final Exam, Part II

May 7, 2003

Do all problems

Show all work

Calculators are allowed on Part II

Your Name:______________________________ **ID**:__________________

Please circle your section number.

Section	Instructor	Days & Times
R01	D. Pray	MWF 8 a.m.
R03	I. Kliakhandler	MWF 9 a.m.
R04	L. Young	MWF 9 a.m.
R05	B. Baartmans	MWF 10 a.m.
R06	C. Sarami	MWF 11 a.m.
R07	O. Paez Osuna	MWF 11 a.m.
R08	B. Bertram	MWF 12 p.m.
R09	G. Lewis	MWF 2 p.m.
R10	C. Gay	MWF 8 a.m.
R11	G. Lewis	MWF 3 p.m.
R12	D. Olson	MWF 4 p.m.

Score (Part II)

pg 1 = ________ / 9
pg 2 = ________ / 12
pg 3 = ________ / 8
pg 4 = ________ / 10
total = ________ / 39

Work on Part I first. It will be collected sometime during the middle of the exam period.

You may work on Part I of this exam at any time, but you must have handed in Part I before you may use your calculator on Part II.

12. If f is an increasing function on the interval $[a, b]$ and its graph is concave upward on $[a, b]$, put the following approximations to $\int_a^b f(x)dx$ in increasing order: LEFT(10), RIGHT(10), MID(10), TRAP(10), and SIMP(10).

answer:______________________________________ (4 points)

13. The table below gives certain values for a function f. Use the trapezoidal rule with $n = 5$ to estimate $\int_0^{15} f(x)dx$.

x	0	3	6	9	12	15
f(x)	4	17	32	45	53	59

TRAP(5)=__________ (5 points)

14. The region, R, in the (x, y)-plane is bounded by $y = \sqrt{x}, x = 1$, and $y = 0$. It is then revolved about the x-axis to produce a solid of revolution.

(a) Sketch the planar region, R.

(1 point)

(b) Calculate the volume of the solid of revolution.

volume=____________ (5 points)

15. A fuel tank is an upright right circular cylinder, buried so that its circular top is 10 feet beneath ground level. The tank has a radius of 6 feet, and is 18 feet high. It is filled with oil which weighs 50 pounds per cubic foot. Set up the integral that would be used to calculate the work done in pumping all of the oil to ground level, but do <u>not</u> evaluate it. Include units.

work=______________ (6 points)

Do not evaluate.

16. Consider the differential equation $\frac{dy}{dx} = y$, with $y(0) = 1$.

(a) Show Euler's method for approximating the solution using two steps with $\Delta x = 0.05$. What does Euler's method predict for $y(0.1)$?

$y(0.1) =$______________ (4 points)

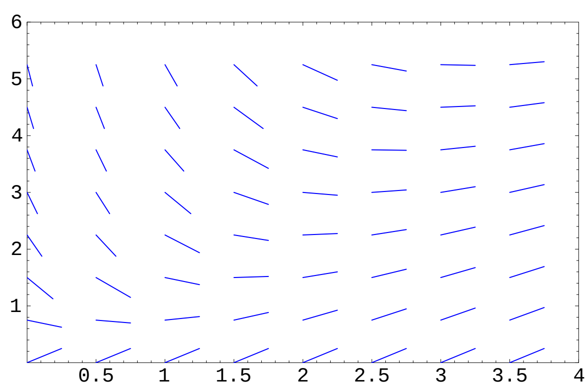
(b) Solve the problem exactly for $y(x)$ and find $y(0.1)$.

$y(x) =$______________ $y(0.1) =$______________ (4 points)

17. A potato at room temperature ($70°F$) is put into a $350°F$ oven. It heats up according to Newtons Law, which states that the rate of change of temperature is proportional to the difference between the temperature of the object and the temperature of the environment. Let $T(t)$ be the temperature of the potato at time t, where T is measured in $°F$, and t is in hours. The differential equation for $T(t)$ is $\frac{dT}{dt} = k(T - 350)$. The initial condition is $T(0) = 70$. Suppose you also know that the temperature of the potato one hour later is $320°F$. Solve the initial value problem for the temperature of the potato as a function of time.

$T(t) =$____________________ (6 points)

18. The following diagram shows the slope field for the differential equation $y' = 1 - \frac{2y}{1+x^2}$. Sketch the solution which satisfies the initial condition $y(0) = 3$. Use your graph to estimate the value of $y(4)$.



$y(4) =$_______________ (4 points)