Name: _____

Instructor: _____

Exam II - 126 2000S
March 21, 2000

- The Honor Code is in effect for this examination. All work is to be your own.
- No calculators.
- The exam lasts for one hour.
- Be sure that your name is on every page in case pages become detached.
- Be sure that you have all 11 pages of the test.

Good Luck!

PLEASE MARK YOUR ANSWERS WITH AN X, not a circle!

1.	(a)	(b)	(c)	(d)	(e)
2.	(a)	(b)	(c)	(d)	(e)
3.	(a)	(b)	(c)	(d)	(e)
4.	(a)	(b)	(c)	(d)	(e)
5.	(a)	(b)	(c)	(d)	(e)
6.	(a)	(b)	(c)	(d)	(e)
7.	(a)	(b)	(c)	(d)	(e)
8.	(a)	(b)	(c)	(d)	(e)
9.	(a)	(b)	(c)	(d)	(e)
10.	(a)	(b)	(c)	(d)	(e)

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Total multiple choice: _____

11. _____

12. _____

13. _____

14. _____

15. _____

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Multiple Choice

1.(5 pts.) Solve the initial value problem $\frac{dy}{dx} = \frac{3x^2 - 1}{e^y}$, $y(1) = 1$.

(a) $y = \ln(x^3 + x) + \ln(e/2)$

(b) $y = e^{x^3 - x}$

(c) $y = e^{x^3 - 2x + 1}$

(d) $y = \arctan\left(\frac{1}{\sqrt{3}}\right) + \frac{\pi}{4}$

(e) $y = \ln(x^3 - x + e)$

2.(5 pts.)

$$\int \frac{x^2}{1 + x^2} dx =$$

(a) $\sec x \tan x + c$

(b) $\arctan \frac{1}{x} + c$

(c) $\frac{x}{2} \ln|1 + x^2| + c$

(d) $x - \arctan x + c$

(e) $\frac{1}{2} \ln|1 + x^2| + c$

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3.(5 pts.)

$$\int_4^5 \frac{1}{x^2 - 5x + 6} dx =$$

(a) $\ln \frac{4}{3}$ (b) divergent (c) $\ln \frac{5}{4}$ (d) $\ln 20 - \ln 3$ (e) $\ln 5 - \ln 3$

4.(5 pts.)

$$\int (2x + 1)e^x dx =$$

(a) $(x^2 + x + c)e^x$ (b) $(x^2 + x)e^x + c$ (c) $2xe^x - e^x + c$

(d) divergent (e) $\frac{1}{2}xe^{x^2+1} + c$

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5.(5 pts.)

$$\int \ln(1-x)dx =$$

(a) $\frac{-2x}{1-x^2} + c$

(b) $x\ln(1-x) - x + c$

(c) $(x-1)\ln(1-x) - x + c$

(d) $(1-x)\ln(1-x) - (1-x) + c$

(e) $\ln(\arctan x^2) + c$

6.(5 pts.)

$$\int_0^1 \frac{2xdx}{\sqrt{1-x^2}} =$$

(a) 1/2 (b) 2 (c) divergent (d) 1 (e) -4

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7.(5 pts.) If $a_1 = -1$, $a_2 = 2$, and $a_{n+2} = a_{n+1} + a_n$ for $n \geq 1$ what is a_5?

(a) 4 (b) -5 (c) 2 (d) 5 (e) -1

8.(5 pts.) Determine $\lim_{k\to\infty} 1 + \frac{2^k}{k!}$

(a) ∞ (b) 0 (c) 1 (d) $1/k!$ (e) $3/2$

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9.(5 pts.) List all values of x for which $\displaystyle\sum_{n=1}^{\infty}\left(\frac{1}{x^2+3/4}\right)^n$ converges.

(a) $x > \sqrt{3/4}$ (b) $|x| > 1/2$ (c) $|x| \geq 1$ (d) $|x| \geq \sqrt{3}/2$ (e) $x \neq 0$

10.(5 pts.) Determine $\displaystyle\sum_{n=1}^{\infty}\left((1/2)^n + (1/4)^n\right)$

(a) 3/2 (b) 9/4 (c) 3/4 (d) 4/3 (e) 3

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Partial Credit

11.(10 pts.) Solve the equation

$$t\frac{dy}{dt} + 2y = 5t^3$$

with initial condition $y(1) = 0$.

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12.(10 pts.) Find just the partial fraction decomposition (not the integral) of

$$\frac{2x^2 - 4x + 1}{(x-1)^2(x-2)} =$$

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13.(10 pts.) Using substitution, and then a trig substitution, find

$$\int_1^e \frac{dy}{y\sqrt{1+(\ln y)^2}} =$$

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14.(10 pts.) Does $\int_1^\infty \frac{(1+\sin x)}{x^{4/3}} dx$ converge or diverge? Why?

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15.(10 pts.) Determine the convergence of the sequence $\{a_n\}$ with $a_n = \dfrac{1}{n^2}\displaystyle\int_1^n x\ dx$.

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