ANSWER SHEET

MATH 122 - FINAL EXAM PRINT NAME: _____
Last, First name

Circle your instructor: Rosencrans Kwasik Tipler Georgescu Dauns

Thursday, May 5, 2005 – 8:00 AM – 12:00 NOON

1. Do NOT SEPARATE answer sheet from rest of test.
2. Circle the name of your instructor.
3. CIRCLE the answer to each problem INSIDE this test.
4. Circle your answer a SECOND TIME on this page.
5. Do all **20** problems.
6. Turn in ENTIRE TEST.

QUESTION	ANSWER					QUESTION	ANSWER				
1.	[a]	[b]	[c]	[d]	[e]	11.	[a]	[b]	[c]	[d]	[e]
2.	[a]	[b]	[c]	[d]	[e]	12.	[a]	[b]	[c]	[d]	[e]
3.	[a]	[b]	[c]	[d]	[e]	13.	[a]	[b]	[c]	[d]	[e]
4.	[a]	[b]	[c]	[d]	[e]	14.	[a]	[b]	[c]	[d]	[e]
5.	[a]	[b]	[c]	[d]	[e]	15.	[a]	[b]	[c]	[d]	[e]
6.	[a]	[b]	[c]	[d]	[e]	16.	[a]	[b]	[c]	[d]	[e]
7.	[a]	[b]	[c]	[d]	[e]	17.	[a]	[b]	[c]	[d]	[e]
8.	[a]	[b]	[c]	[d]	[e]	18.	[a]	[b]	[c]	[d]	[e]
9.	[a]	[b]	[c]	[d]	[e]	19.	[a]	[b]	[c]	[d]	[e]
10.	[a]	[b]	[c]	[d]	[e]	20.	[a]	[b]	[c]	[d]	[e]

SCORE: _____

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Section #:_____ Social Security Number: _____

5 pts **(1.)** $\int_0^1 \arcsin x \, dx =$

[a] π [b] $\frac{\pi}{2}$ [c] $\pi - 1$

[d] $\frac{\pi}{2} - 1$ [e] None of the above

5 pts **(2.)** A parabola passes through the points $(1;4)$, $(3/2;5)$, and $(2;3)$. The area under this parabolic segment above the interval $1 \leq x \leq 2$ is equal to:

[a] $\frac{9}{2}$ [b] 3 [c] $\frac{3}{4}$

[d] $\frac{3}{2}$ [e] None of the above

5 pts **(3.)** The solution to the initial value problem

$$\frac{dy}{dt} + 3y = 6 \quad ; \quad y(0) = 7$$

is given by:

[a] $y = 6e^{-3t} + 1$ [b] $y = 6e^{3t} + 1$ [c] $y = 2 + 5e^{-3t}$

[d] $y = 7e^{-3t}$ [e] None of the above

5 pts **(4.)** The solution of $\frac{dy}{dx} = \frac{y^2+4}{x^2-1}$, $y(0) = 2$ satisfies:

[a] $\ell n\,|y^2 + 4| = \ell n\,|x^2 - 1| + \ell n\, 6$

[b] $\arctan \frac{y}{2} = \ell n\,|\frac{x-1}{x+1}| + \frac{\pi}{4}$

[c] $\frac{1}{2}\arctan \frac{y}{2} = \ell n\,|x^2 - 1| + \frac{\pi}{2}$

[d] $\arctan y = \ell n\,|\frac{x-1}{x+1}| + \arctan 2$

[e] None of the above

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5 pts **(5.)** The curve $\vec{r}(t) = \langle \cos^2 t, \sin^2 t \rangle$, $-\infty < t < \infty$ is:

[a] a circle [b] an ellipse [c] a line segment

[d] a line [e] None of the above

5 pts **(6.)** The arc length of the curve $\vec{r}(t) = \langle \cos^2 t, \sin^2 t \rangle$, $0 \leq t \leq \frac{\pi}{2}$ is equal to:

[a] $2\sqrt{2}$ [b] 1 [c] $\frac{\sqrt{2}}{2}$

[d] $\sqrt{2}$ [e] None of the above

5 pts **(7.)** The volume of the solid obtained when the region bounded by the line $y = 2x$, the line $x = 3$ and the x-axis is rotated about the y-axis is equal to:

[a] 36π [b] 42π [c] 16π

[d] 18π [e] None of the above

5 pts **(8.)** The value of the integral $\int_1^\infty \frac{\ell n\, x}{x^2}\, dx$ is:

[a] 1 [b] $\ell n\, 2$ [c] e^{-1}

[d] the integral diverges [e] None of the above

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5 pts **(9.)** The value of the integral $\int_0^1 \frac{1}{\ell n\,(1+x)}\,dx$ is:

[a] 1 [b] e [c] $\frac{1}{e}$

[d] the integral diverges [e] None of the above

5 pts **(10.)** A cylindrical water tank of radius $10\,ft$ and height $30\,ft$ is half filled with water. How much work is required to pump all the water over the upper rim of the tank? Assume water weighs $62.4\,lb/ft^2$.

[a] $2,106,000\pi\ ft/lb$ [b] $2,106,000\ ft/lb$ [c] $2.1\times 10^9\ ft/lb$

[d] $2,106\pi\ ft/lb$ [e] None of the above

5 pts **(11.)** The Taylor polynomial of order 3 generated by $f(x)=\cos x$ at $x=0$ is:

[a] $1-\frac{x^2}{2!}$ [b] $1-\frac{x^2}{2!}+\frac{x^4}{4!}$ [c] $x-\frac{x^2}{3!}$

[d] $x-\frac{x^3}{3!}+\frac{x^5}{5!}$ [e] None of the above

5 pts **(12.)** $\lim_{n\to\infty}\left(\sqrt{n^2+n}-n\right)$ is equal to:

[a] 2 [b] $\frac{1}{3}$ [c] $\frac{1}{2}$

[d] Does not exist [e] None of the above

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5 pts **(13.)** The sum of the series $\sum_{n=0}^{\infty} \frac{2^{n+1}}{5^n}$ is equal to:

[a] $\frac{17}{2}$ [b] $\frac{17}{6}$ [c] $\frac{10}{3}$

[d] The series diverges [e] None of the above

5 pts **(14.)** The interval of convergence for the series $\sum_{k=1}^{\infty} \frac{x^k}{k}$ is equal to:

[a] $[-1, 1]$ [b] $(-2, 2)$ [c] $[-1, 1)$

[d] $(-2, 2]$ [e] None of the above

5 pts **(15.)** The Taylor series about $x = 0$ for $f(x) = e^{2x}$ is:

[a] $2\sum_{n=0}^{\infty} \frac{x^n}{n!}$ [b] $\sum_{n=0}^{\infty} \frac{(2x)^n}{n!}$ [c] $\sum_{n=0}^{\infty} \frac{(-2)^n x^n}{n!}$

[d] $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{2x^n}{n}$ [e] None of the above

5 pts **(16.)** The lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and $\frac{x+1}{6} = \frac{y-3}{-1} = \frac{z+5}{2}$ are:

[a] parallel [b] intersecting [c] skew

[d] perpendicular [e] None of the above

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5 pts **(17.)** The volume of the parallelopiped determined by the vectors $\vec{u} = \vec{\imath} + 2\vec{\jmath} - \vec{k}$; $\vec{v} = 7\vec{\jmath} - 4\vec{k}$; $\vec{w} = -2\vec{\imath} + 3\vec{k}$ is equal to:

[a] 23 [b] 13 [c] -24

[d] 29 [e] None of the above

5 pts **(18.)** The curvature of $\vec{r}(t) = \left\langle \sqrt{2}t, e^t, e^{-t} \right\rangle$ at the point $(0, 1, 1)$ is:

[a] $\frac{\sqrt{2}}{2}$ [b] $\frac{\sqrt{2}}{4}$ [c] $\frac{1}{2}$

[d] $\frac{1}{4}$ [e] None of the above

5 pts **(19.)** A parametric equation of the tangent line to the curve $\vec{r}(t) = \left\langle \ell n\, t, 2\sqrt{t}, t^2 \right\rangle$ at the point $(0, 2, 1)$ is

[a] $x(t) = \frac{1}{t}$; $y(t) = \frac{1}{\sqrt{t}}$; $z(t) = 2t$

[b] $x(t) = \frac{1}{t}$; $y(t) = 2 + \frac{1}{\sqrt{t}}$; $z(t) = 1 + 2t$

[c] $x(t) = t$; $y(t) = 1 + 2t$; $z(t) = 2 + t$

[d] $x(t) = 2 + t$; $y(t) = t$; $z(t) = 1 + 2t$

[e] None of the above

5 pts **(20.)** An equation of the plane passing through $(-4, 1, 2)$ and parallel to the plane $x + 2y + 5z = 3$ is given by

[a] $-4x + y + 2z = 3$ [b] $x + 2y + 5z = 0$ [c] $x + 2y + 5z = -8$

[d] $x + 2y + 5z = 8$ [e] None of the above