CALCULUS 221
11th WEEK EXAM

I. M. Isaacs
Thursday, Nov 15, 2001
5:30 – 7:00 P.M.

Do all problems — 100 points.
Use backs of pages for scrap, or if you need more space.

ME: _____

_____

Do not write below here.

b. 1: _____ out of 28.

b. 2: _____ out of 12.

b. 3: _____ out of 8.

b. 4: _____ out of 18.

b. 5: _____ out of 8.

b. 6: _____ out of 13.

b. 7: _____ out of 13.

al: _____ out of 100.

[28 POINTS] Find these antiderivatives.

) $\displaystyle\int \frac{2-3x^3}{\sqrt{x}}\,dx$

$\displaystyle\int \sec^5(3x)\tan(3x)\,dx$

$\displaystyle\int \frac{x^2\,dx}{\sqrt[3]{1-8x^3}}$

$\displaystyle\int \frac{\sin(2/x)\,dx}{x^2}$

[12 POINTS] Evaluate these limits. (If the limit does not exist, say so.)

$\lim_{x \to -1} \dfrac{x+1}{2x^2 - x - 1}$

$\lim_{t \to 1} \dfrac{\sqrt{4t-3} - 2t + 1}{(t-1)^2}$

[8 POINTS] Consider the integral $\int_{-1}^{3} (1 + 3x^2)\, dx$. Let S_n be the Riemann sum corresponding his integral, where we take n equal subintervals and we use the midpoints of the subintervals as sample points

Compute the value of the Riemann sum S_2.

Compute $\lim_{n \to \infty} S_n$ if the limit exists. (Otherwise, explain BRIEFLY how you know that the limit ; not exist.)

[18 POINTS] For each of the following, compute the value of y when $x = 2$.

) $\frac{dy}{dx} = \frac{4-x}{x^3}$ and $y = 1$. when $x = 1$.

$\frac{dy}{dx} = \frac{4-x}{y}$ and $y = 1$. when $x = 1$. (Assume $y > 0$ always.)

[8 POINTS] A particle moves along the x-axis in such a way that its acceleration a is x^2 units per second per second when the particle is at position x. The velocity v when the particle passes the origin is 2 units per second (moving toward the right). Find the velocity when the particle passes the point $x = 3$. HINT: Use the chain rule to write dv/dt in a more convenient form.

[13 POINTS] Find the maximum and minimum values of $(1-x)^5 + 5x$ for $1 \leq x \leq 3$ and ve the values of x where the maximum and minimum occur. If there is no maximum or minimum, plain BRIEFLY how you know.

7. [13 POINTS] I am flying a kite in a wind blowing toward the east. The kite is moving horizontally at an altitude of 400 feet, and so I must pay out string from the spool that I am holding. Find the rate at which the string is unwinding from the spool when the kite is directly over the point 300 feet east of where I am standing, if at that moment, the kite is moving east at 10 feet per second.

THE END