Math 105 **Fall semester 1993-94**

Proposed test No. 3

Multiple choice questions:

1. If $x^2 y^3 + x^3 y^2 = 5$, then $\frac{dy}{dx}$ equals

(a) $-\frac{2y^2 + 3xy}{3xy + 2x^2}$, (b) $\frac{2y^2 + 3xy}{3xy + 2x^2}$, (c) $\frac{5}{xy^3 + 3x^2y^2}$, (d) $2\ln x - 3\ln y$,

(e) none of the above.

2. The solution of the equation $e^{6x - 4} = 3$ is

(a) $\frac{\ln 3 + 4}{6}$, (b) $\ln 6 - \ln 4$, (c) 2, (d) $\frac{\ln 4}{\ln 6} - 3$, (e) $\frac{e^{1/2}}{3}$

3. The derivative of the function $f(x) = x \ln(x^2 + 1)$ equals

(a) $\ln(x^2 + 1) + \frac{2x^2}{x^2 + 1}$, (b) $\frac{2x^2}{x^2 + 1}$, (c) $\ln(x^2 + 1) + \frac{x}{x^2 + 1}$,

(d) $(1 + 2x)\ln(x^2 + 1)$, (e) $\frac{x}{x^2 + 1}$,

4. Find the derivative of the function $f(x) = x^2 e^{3x}$

(a) $(2x + 3x^2) e^{3x}$ (b) $2x + 3x^2 + e^{3x}$, (c) $(x + x^2) e^{3x}$ (d) $= 2x e^{3x}$

(e) none of the above.

5. Let $f(x) = a e^{kx}$, where a and k are constant. If $f(3) = 100$, $f(5) = 200$, then $f(7)$ equals

(a) 300, (b) 400, (c) 525, (d) 540, (e) 700

6. The function $f(x) = x^2 e^{-x}$ has a relative minimum at the point

(a) 0, (b) - 1, (c) 2, (d) e, (e) $\frac{1}{e}$

7. The function $f(x) = x^2 \ e^{-x}$ has a relative maximum at the point

(a) 0, (b) - 1, (c) 2, (d) e, (e) $\frac{1}{e}$

8. The indefinite integral $\int (e^{2x+3} - x^{2/3})\, dx$ equals

(a) $\frac{1}{2} \ e^{2x+3} - \frac{3}{5} \ x^{5/3} + C$, (b) $\frac{e^{2x+3}}{2x+3}$, (c) $\frac{1}{2} \ e^{2x+3} - 3 \ x^{1/3}$, (d) $\frac{1}{5}\frac{1}{2} \ e^{2x+3} - x^2 + C$,

(e) none of the above.

9. The integral $\int_1^9 \left(\frac{1}{\sqrt{x}} + \frac{2}{x}\right) dx$ equals

(a) 4 + 2ln 9, (b) 6 + 2ln 9, (c) 6 + ln 9 (d) 4 + 2 ln 3, (e) none of the above.

Partial credit.

10. The volume V [in cubic centimeters] and pressure P [in atmospheres] of a certain amount of gas in a cylinder is related by formula $VP = 1000$. A piston is compressing the gas at the rate of 5 cubic centimeters per second. What is the rate of change of the pressure when V = 500?

11. When John was born, his grandparents bought for his college education at a cost of $10,000 an investment bond. which matured in 18 years and compounded interests annually. At maturity John cashed in the bond for $24,066. What was the annual percentage rate?

12. A radioactive material has halflife of 2 days. If the quantity of the material after 2 days was 3 mg What was the initial quantity. How much will remain after 5 days?