

**MATH 221
CALCULUS II**

**NAME:
ID#:**

TAKE-HOME EXAM 2

Solve the following problems showing all your work for full credit.

Evaluate each of the following integrals.

1. (4 pts.) $\int x^3 \cos x dx$

2. (4 pts.) $\int x^2 e^{2x} dx$

3. (4 pts.) $\int e^x \cos 2x dx$

4. (4 pts.) $\int \ln x dx$

5. (4 pts.) $\int \cos^3 x \sin^4 x dx$

6. (4 pts.) $\int \sin^2 2x dx$

7. (4 pts.) $\int \sin^4 2x dx$

8. (4 pts.) $\int \sec^6 2x \tan 2x dx$

9. (4 pts.) $\int \sec^2 3x \tan^5 3x dx$

10. (4 pts.) $\int \frac{x^2}{\sqrt{4-x^2}} dx$

11. (4 pts.) $\int \frac{x^3}{\sqrt{x^2-4}} dx$

12. (4 pts.) $\int \frac{x^2}{(1+x^2)^2} dx$

13. (4 pts.) $\int \frac{1}{x\sqrt{4x^2+16}} dx$

14. (4 pts.) Give the form of the partial fraction decomposition of the rational expression

$\frac{x^3 - 2x^2 + 3x - 4}{x(x-2)(x+3)^3(x^2+x+2)^2}$. Do not solve for the constants.

15. (4 pts.) Evaluate the integral $\int \frac{x+1}{x^2+5x+6} dx$.

16. (4 pts.) Evaluate the integral $\int \frac{6x}{x^3-8} dx$.

17. (4 pts.) Evaluate the integral $\int \frac{x+2}{x^2-4x} dx$.

18. (4 pts.) Evaluate the integral $\int \frac{4x^2}{x^3+x^2-x-1} dx$.

19. (4 pts.) Evaluate the integral $\int \frac{x^3}{x^2-2x+1} dx$.

20. (4 pts.) Evaluate the integral $\int \frac{\ln x}{x(4-\ln^2 x)} dx$.

21. (4 pts.) Evaluate the integral $\int \frac{\cos x}{(\sin x + 2)(\sin x - 3)} dx$.

22. (4 pts.) Evaluate the integral $\int_2^{\infty} \frac{2dt}{t^2 - 1}$.

23. (4 pts.) Evaluate the integral $\int_0^1 x \ln x dx$.

24. (4 pts.) Test the integral for convergence: $\int_{\pi}^{\infty} \frac{1 + \sin x}{x^2} dx$.

25. (4 pts.) Test the integral for convergence: $\int_{-\infty}^{\infty} \frac{2dx}{e^x + e^{-x}}$.