

Do all your work and put all your answers WITH your work, CIRCLED, on the white paper provided. All I want on this sheet is your NAME! Spend no more than 2 minutes on any single problem on your first pass through the test. If you don't finish a problem in 2 or 3 minutes, start a fresh sheet of paper for the next problem, and so on.

Formatting should be the same as homework, only you don't need to re-state the question, because the question's attached to your test!

Evaluate the following definite and indefinite integrals.

1. (10 pts) $\int x^2 e^x dx$
2. (10 pts) $\int e^x \cos(s) dx$
3. (10 pts) $\int \sin^4(x) dx$
4. (10 pts) $\int \frac{1}{x^2 + 3x - 28} dx$ (Use Partial Fractions.)
5. (10 pts) $\int \cos(2x)\cos(3x) dx$ (Hint : $\cos(x)\cos(y) = \frac{1}{2}[\cos(x-y) + \cos(x+y)]$)
6. Evaluate $\int \frac{dx}{\sqrt{x^2 + 9}}$ in two ways:
 - a. (10 pts) Use Formula 20: $\int \frac{dx}{\sqrt{x^2 + a^2}} = \ln|x + \sqrt{x^2 + a^2}| + C$
 - b. (10 pts) Use Trigonometric Substitution.

7. Evaluate the following improper integrals:

- a. (10 pts) $\int_1^{\infty} \frac{dx}{\sqrt{x^3}}$
- b. (10 pts) $\int_0^1 \frac{dx}{\sqrt[3]{x^2}}$

8. Make a general argument for the convergence or divergence of the following improper integrals:

- a. (5 pts) $\int_0^1 \frac{dx}{(x-1)^{3/4}}$
- b. (5 pts) $\int_1^{\infty} \frac{dx}{x^{3/5} - 27\sqrt{x} + 77}$

BONUS Section:

1. (5 pts) Evaluate $\lim_{x \rightarrow \infty} (x^{1/x})$
2. (5 pts) Differentiate $f(x) = x^{1/x}$.
3. (5 pts) Evaluate $\int \frac{1}{x^2 + 3x - 28} dx$, because I forgot to put it on the test (That's why #4 = #1!)

