MAT 202 Test 2 Makeup, Spring, 2020 Name _____
80 Points Covers Chapter 7

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!

1. (15 pts) Evaluate $\int x e^{-3x}\,dx$

2. (15 pts) Evaluate $\int x^2 \ln\left(\sqrt[5]{x^4}\right) dx$

3. Evaluate $\int_{-\sqrt{2}}^{\sqrt{3}} x\sqrt{4-x^2}\,dx$ in two ways:

   a. (10 pts) By *u*-substitution.

   b. (10 pts) By trigonometric substitution.

4. (10 pts) Evaluate $\int \frac{10x+13}{x^2-x-20} dx$

5. (10 pts) $\int \cos(3x)\cos(11x)\,dx$

6. (10 pts) Evaluate $\int \sin^4(x)\,dx$

Work up to 15 points' worth of Bonus, below:

Bonus 1: (5 pts) Evaluate $\int_1^{\sqrt{3}} \frac{\sqrt{4-x^2}}{x^2} dx$ by any method.

Bonus 2: (5 pts) Evaluate $\int_e^{\infty} \frac{dx}{x(\ln(x))^4}$

Bonus 3: (5 pts) Evaluate $\lim_{x\to 0}\left[(1+x)^{\frac{3}{x}}\right]$

Bonus 4: (5 pts) Evaluate $\int e^x \sin(x)\,dx$

$$\sin A \cos B = \tfrac{1}{2}[\sin(A - B) + \sin(A + B)]$$

$$\sin A \sin B = \tfrac{1}{2}[\cos(A - B) - \cos(A + B)]$$

$$\cos A \cos B = \tfrac{1}{2}[\cos(A - B) + \cos(A + B)]$$

Forms Involving $\sqrt{a^2 - u^2}$, $a > 0$

30. $\displaystyle\int \sqrt{a^2 - u^2}\, du = \frac{u}{2}\sqrt{a^2 - u^2} + \frac{a^2}{2}\sin^{-1}\frac{u}{a} + C$

31. $\displaystyle\int u^2\sqrt{a^2 - u^2}\, du = \frac{u}{8}(2u^2 - a^2)\sqrt{a^2 - u^2} + \frac{a^4}{8}\sin^{-1}\frac{u}{a} + C$

32. $\displaystyle\int \frac{\sqrt{a^2 - u^2}}{u}\, du = \sqrt{a^2 - u^2} - a\ln\left|\frac{a + \sqrt{a^2 - u^2}}{u}\right| + C$

33. $\displaystyle\int \frac{\sqrt{a^2 - u^2}}{u^2}\, du = -\frac{1}{u}\sqrt{a^2 - u^2} - \sin^{-1}\frac{u}{a} + C$

34. $\displaystyle\int \frac{u^2\, du}{\sqrt{a^2 - u^2}} = -\frac{u}{2}\sqrt{a^2 - u^2} + \frac{a^2}{2}\sin^{-1}\frac{u}{a} + C$

Forms Involving $\sqrt{u^2 - a^2}$, $a > 0$

39. $\displaystyle\int \sqrt{u^2 - a^2}\, du = \frac{u}{2}\sqrt{u^2 - a^2} - \frac{a^2}{2}\ln\left|u + \sqrt{u^2 - a^2}\right| + C$

40. $\displaystyle\int u^2\sqrt{u^2 - a^2}\, du = \frac{u}{8}(2u^2 - a^2)\sqrt{u^2 - a^2} - \frac{a^4}{8}\ln\left|u + \sqrt{u^2 - a^2}\right| + C$

41. $\displaystyle\int \frac{\sqrt{u^2 - a^2}}{u}\, du = \sqrt{u^2 - a^2} - a\cos^{-1}\frac{a}{|u|} + C$

42. $\displaystyle\int \frac{\sqrt{u^2 - a^2}}{u^2}\, du = -\frac{\sqrt{u^2 - a^2}}{u} + \ln\left|u + \sqrt{u^2 - a^2}\right| + C$