Name _____ Calculus 2 Huff Integration Project Fall 2010

1. $\int \frac{1}{\sqrt{1+\sqrt{1+x}}}\,dx$

2. $\int_0^{\pi/4} \sec^4\theta\, d\theta$

3. $\int_0^{\pi} \cos mx \cos nx\, dx$, where m and n are integers with $m \neq \pm n$.

4. $\int_0^{1/\sqrt{2}} x \tan^{-1}(x^2)\, dx$

5. $\int_1^r \left(\ln x\right)^2 dx$

6. Use integration by parts to show that for real numbers *a* and *b*,
$$\int e^{ax}\cos bx\, dx = \frac{e^{ax}\left(a\cos bx + b\sin bx\right)}{a^2+b^2} + C$$

7. $\int \frac{x^2}{x^3 - x^2 + 4x - 4}\, dx$

8. $\int \sin^3 x \cos^{3/2} x\, dx$

9. $\int_0^{\pi/4} \sqrt{\left(1+\cos 4x\right)^3}\, dx$

10. $4\int_0^r \sqrt{r^2 - x^2}\, dx$

11. $\int_a^{\infty} \sqrt{e^{-x}}\, dx$ where a is any finite real number.

12. $\int_{-3}^{3} \frac{1}{\sqrt{9-x^2}}\, dx$

13. Use (a) Simpson's Rule (b) the Trapezoidal Rule, and (c) the Midpoint Rule with $n = 6$ to approximate π using the equation
$$\pi = \int_0^1 \frac{4}{1+x^2}\, dx.$$

Take-Home Test – No help from the Learning Lab

Deadline: 9/20/2010

Calculus 2
Integration Project
Mike Huff
Fall 2010

Directions: Copy all finished work neatly onto paper. Put the finished problems ***in order*** and staple the work together.

All work must be done neatly with detailed explanations. That includes defining *u* when making substitutions, and showing *u*, *du*, *v*, and *dv* for any integration by parts. Write out each term for numerical techniques, etc.

You may check your work using calculators or computers but you must show each step of the calculation for full credit.

You may share ideas but you may not copy another student's work.

You may get help from the lab *on the techniques* but they may not work out any of these problems for you.