**Assignment 16: Integration Techniques (6.1-6)     Name______________________**
**Please provide a handwritten response.**

**1a.** Using identities you can often show that two different-looking results for an integral are both correct. Evaluate $\int \boldsymbol{cos^3\, x\, sin^2\, x\, dx}$ by hand and record the result below.

**1b.** Evaluate this integral on your calculator by evaluating $\int((cos(x))\wedge 3*(sin(x))\wedge 2, x, c)$ and record the results below. Does your answer look the same as your answer in **1a**?

**2a.** Multiplication can be denoted by a * on your calculator. Some calculators will accept a space for multiplication (as will some computer algebra systems). Find $\int x\, sin\, x\, dx$ by first evaluating $\int(x * sin(x), x, c)$ and then as $\int(x \;\; sin(x), x, c)$. Record the results below. Is there any difference between the two?

**2b.** Now repeat the last command without the space between the ***x*** and ***sin*(*x*).** Record the result below. What does this result mean?

**3a.** The inverse tangent function is denoted on your calculator by $tan^{-1}$. Execute $\int(e\wedge(x)* tan^{-1}(e\wedge(x)), x, c)$ to evaluate $\int e^x\, tan^{-1}(e^x)\, dx$. Record the results below.

**3b.** The history screen on your calculator contains the last 30 entry/answer pairs. If you want to work with one of these previous expressions you can use the up arrow key to find and highlight the desired expression. Pressing **ENTER** will place the highlighted entry in the entry line. Highlight $\int(e\wedge(x)* tan^{-1}(e\wedge(x)), x, c)$ in the history area and press

**ENTER.** Execute the command by pressing **ENTER** again and compare the answer to the answer in part **3a**.

**3c.** You can differentiate the result in part **3a** using the ***d*** command. Enter ***d(*** . Place the answer to **3a** in the entry line by highlighting it and pressing enter. Finish by typing **,** ***x***). The entire entry should be $d\left(-ln\left(e\wedge\left(2*x\right)+1\right)/2+e\wedge\left(x\right)*tan^{-1}\left(e\wedge\left(x\right)\right),x\right)$. Execute this entry and record the result below.

**4a.** Evaluate $\int x^3 e^{5x} cos\left(3x\right)dx$ by executing $\int\left(x\wedge 3*e\wedge\left(5x\right)*cos\left(3x\right),x,c\right)$ and record your answer below.

**4b.** Now check your result by evaluating $d\left(ans\left(1\right),x\right)$. The ***d*** is accessed by **2nd 8** and the ***ans*(1)** is accessed by **2nd (-)**. Record your answer below. Did you get what you expected?

**5a.** Your calculator will perform a partial fraction decomposition using the **expand** command. Perform a partial fraction decomposition on $\dfrac{x^2+2x-1}{\left(x-1\right)^2\left(x^2+4\right)}$ by entering $exp\,and\left(\left(\left(x\wedge 2\right)+2x-1\right)/\left(\left(x-1\right)\wedge 2\left(\left(x\wedge 2\right)+4\right)\right)\right)$ and record the result below. Check your result by executing $comDenom\left(ans\left(1\right),x\right)$. Does everything look correct?

**5b.** Use the $\int$ command to find an antiderivative of the expression in **5a** and record the result below.

**5c.** Now proceed as in **4b** to check your result. Is it correct?

**6.** Repeat **5a-c** through for $y=\dfrac{3x}{x^2-3x-4}$. Are you able to confirm that your calculator's antiderivative is correct? Explain.