

Names : _____ / _____ / _____ .

Chapter 2

Floating point versus exact arithmetic

Compute each of the following expressions following the same procedures as in Chapter 1. Only now we can forget about “P” in P&B but let’s try to still use “B”.

Comments, especially with respect to
the differences between the SGC
result and the MAPLE result.

SGC	MAPLE	
1. $13!$		
2. $14!$		
3. $15!$		
4. $16!$		
5. $14!+1$		
6. $15!+1$		
7. $16!+1$		
8. $15!/2$		
9. $16!/2$		

10. $1/6!$

11		

12. $1/8!$

--	--	--

13. $1+1/6!$

--	--	--

14. $(1+1/6!)^{10}$

--	--	--

15. $(1+1/6!)^{100}$

--	--	--

16. $\frac{1}{50!}$

--	--	--

17. $\frac{1}{50!} + 1$

--	--	--

Exercise. Explain the difference between the TI-86 answer in number 2 and in number 3 above.

--

Exercise. Why does the TI-86 answer in number 5 agree with the MAPLE answer, while the TI-86 answer in number 6 differs from the MAPLE answer?

--

Exercise. Why does the TI-86 answer in number 8 agree with the MAPLE answer, while the TI-86 answer in number 9 differs from the MAPLE answer?

Exercise. In numbers 10-17 use the **>Frac** command in the TI-86 to try to obtain the MAPLE answers. Conversely use the **evalf** command in MAPLE to try to obtain the TI-86 answers. For which numbers does this work, for which does it not work, and why?

TI ans >Frac →	MAPLE ans evalf →
10.	
11.	
12.	
13.	
14.	
15.	
16.	
17.	

Exercise. Explain the meaning of the term "floating point arithmetic." (Look at 13-15)

Exercise. What do you think the "f" stands for in the evalf command in MAPLE?

Exercise. Experiment with different integers to see if you can determine which of the following expressions is "usually" the bigger. Show some of your calculations.

$2(n!)$ or $(2n)!$

$(n+m)!$ or $n!+m!$

$(n!)^2$ or $(n^2)!$

n^n or $n!$

2^n or $n!$

The MAPLE command **convert(expression,fraction)**; converts the expression to fraction form. Try the following MAPLE sequence:

sqrt(2)=evalf(sqrt(2));sqrt(2)=convert(evalf(sqrt(2)),fraction); What is the result?

Why is this very misleading? What do you think is going on here?

With the TI-86 compute $\sqrt{2}$ and then **>Frac**. What is the result?

Does this mean the TI-86 actually knows about rational versus irrational numbers while MAPLE doesn't? What do you think is going on? (Hint: Find a finite decimal that the TI can not convert to fraction form.)

Experiment with both machines to determine whether or not the conversion from decimal to fraction form is an exact operation in either machine. (Hint: see if you can find two different decimals that convert to the same fraction.) Also find a finite decimal that neither machine can convert to a fraction form.

Reflection: What are the main points the author wants you to get from the exercises in Chapter 2?