CS 206   Homework 3

Your name:

Due: Tuesday, October 4.

⌐ **>**

■ Instructions

Do all of your work in this Maple worksheet. If you are asked to explain something, type your explanation in this worksheet. Do not give the most terse answer that you can think of. Try to give a full explanation of whatever is being asked. Your explanations should be clear, well written, and make use of proper spelling, punctuation, grammar, etc. Make your explanations as presentable as possible. Make use of Maple's basic formatting and word processing abilities. (Do not put your explanations on a Maple command line after a prompt.)

If you need to do a calculation, you should use Maple to do the calculation here in this worksheet. Do not do a calculation on a handheld calculator and then copy the result into this worksheet.

If you need more Maple prompts for commands, use Ctrl-j to create a new prompt.

Be sure to save your worksheet (as a "classic worksheet") as you work on it.

⌐ **>**

■ Problem 1

Part (a): For each function given below, use the classification from Section 4.2.2 to describe what kind function it is. Enter your answer for each function in the text area just below the function.

- (i) $f(x, y) = (\ln(x) + \sin(y), \ln(x) + \sin(y), \ln(x) + \sin(y))$

- (ii) $x \rightarrow (\ln(x), \sin(x))$

- (iii) $\ln(x) + \sin(y)$

- (iv) $(x, y) \rightarrow (\ln(x), \sin(y))$

- (v) $g(u) = (\ln(u), \sin(u), 0)$

- (vi) $x \rightarrow \ln(y) + \sin(x)$

Part (b): Notice that a Maple command like the following one defines a Maple function (in this case the squaring function) and then applies that function to an input (in this case **s**) and the result is an expression.

```
> (x->x^2)(s);
```
$$s^2$$

Carefully explain exactly how the following command simplifies to what it does. (Hint: Use the parentheses to help you organize your explanation.)

```
> ((x,t)->x^2+t)(2*y^2,y^4)-((u,v)->u^2)(y^2,x^3);
```
$$4\,y^4$$

```
>
```

Part (c): Translate the following lines of mathematics into a reasonable sequence of Maple commands that represent the mathematical ideas as closely as possible. Describe in words the meaning of each line.

$$f(x) = 3\,x$$
$$g(x) = x^2$$
Define two equations.
$$f(x) = g(x-5) \qquad (1)$$
$$f(x) = g(x) - 5 \qquad (2)$$
Solve equation (1)

```
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>

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```

Problem 2

Consider the following equation.

$$\frac{y^4}{4} - \frac{9\,y^2}{2} - x = 0$$

Here is what a graph of this equation looks like.

```
> (y^4)/4-(9*y^2)/2-x = 0;
> plots[implicitplot]( %, x=-20..30, y=-5..5, numpoints=1600 );
>
```

Part (a): We want to consider the question of how many functions are defined implicitly by this equation. Looking at the graph, how many (implicit) functions with y as a function of x are defined by the equation? What (approximately) are the domain and codomain for each such function? How many functions with x as a function of y are defined by the equation? What (approximately) are the domain and codomain for each such function? (Be sure to answer all four questions.)

Part (b): Now consider the result of the following **solve** command.

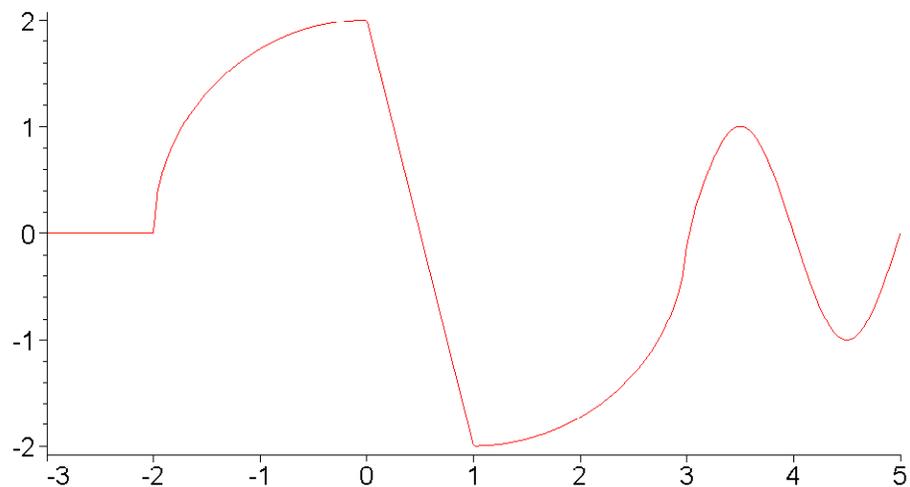```
> solve((y^4)/4-(9*y^2)/2-x = 0, y);
```

There are four parts to this result. Explain how each of these four parts relates to the above graph of the equation and to your answers to part (a). Be specific. Find a way to use Maple commands to justify your conclusions.

```
>
```

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>
```

# − Problem 3

Define a piecewise defined Maple function that has the following graph, for $x$ between $-3$ and 5. Be sure to graph your piecewise defined function.



```
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>
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```
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```