Online Homework System

Name: _____

Class: MAT1320[B] Calculus I [LEC] 20239

Class #: _____

Section #: _____

Instructor: Augusto Gerolin

Assignment: Assignment 1

Question 1: (1 point)

In MapleTA, we write mathematical expressions with calculator syntax. You can check your typesetting with the preview button (looks like a magnifying glass). It is possible to use the symbolic mode to enter formulas (the button with the Σ), but this is slower, and not as reliable.

Some common rules:

- $a \times b = a * b$ (the shorthand ab is sometimes accepted);
- $e^x = e \wedge x$;
- $\sqrt{a} = \mathrm{sqrt}(a)$ or $a \wedge (1/2)$ (since $\sqrt{a} = a^{1/2}$) and similarly $\sqrt[3]{x} = x \wedge (1/3)$;
- $|x| = \mathrm{abs}(x)$.

Don't forget to use parentheses when needed!

Type formulas for the following expressions. Then use the preview button, and "How did I do?" on the right, to verify that your answers are what you wanted. Experiment!

$\dfrac{e^x \sin(x)}{2}$ = _____

$e^{t/2}$ = _____

$\dfrac{1}{x^2/2}$ = _____

$\sqrt[5]{b} =$ _____

$|x^2 - x + 2| =$ _____

Question 2: (1 point)

MapleTA only recognizes two logarithms: $\ln(x)$ (the natural logarithm) and $\log(x)$ (which for MapleTA means the base 10 logarithm $\log_{10}(x)$).

To use any other base, you have to apply the identity

$$\log_a(b) = \frac{\ln(b)}{\ln(a)}.$$

Typeset each of the following expressions. You are encouraged to simplify where possible. Check the correctness of your answer using "How did I do?".

$\ln(x^3)$ = _____

$\log_{10}(300)$ = _____

$\log_2(t)$ = _____

Question 3: (1 point)

We can ask for numerical answers in different ways.

(a) Give the **exact answer** to each of the following questions.

(i) How many radians in 60 degrees? _____ (Calculus ALWAYS uses radians!)

(ii) What is the positive solution to $x^2 - 2 = 0$? _____

When asked for the exact answer, you can (and should!) use formulas like sqrt, and constants like π = pi, even when it asks for a number. Otherwise, we specify the accuracy of your decimal approximation in typically one of two ways:

(c) Give the value of $\pi/100$, **accurate to two decimal places** : $\pi/100$ is approximately _____ .

(d) Express $\pi/100$ to 5 significant digits. Don't forget to round! _____

(Recall that 0.022, written with 3 **significant digits**, is 0.0220 or $2.20 \times 10^{-2} = 2.20E - 2$.)

Most questions on homework require an exact answer.

Question 4: (1 point)

Common notation for trigonometric and inverse trigonometric functions is ambiguous. Be careful!

Examples:

- $\sin^{-1}(x)$ means the inverse sine function, also called $\arcsin(x)$, not $\dfrac{1}{\sin(x)}$. So write "arcsin(x)" in MapleTA.

(a) The inverse function of $y = \cos(x)$ is $y = \cos^{-1}(x) = $ _____ .

- The function $\dfrac{1}{\sin(x)}$ is the cosecant, abbreviated $\csc(x)$. Similarly we use $\tan(x)$ and $\sec(x)$.
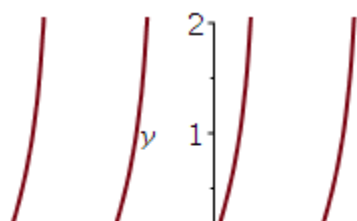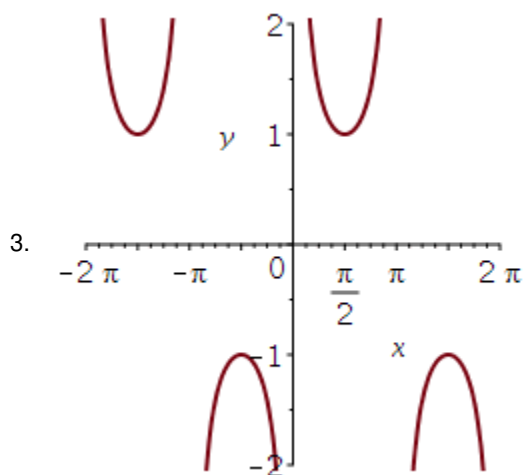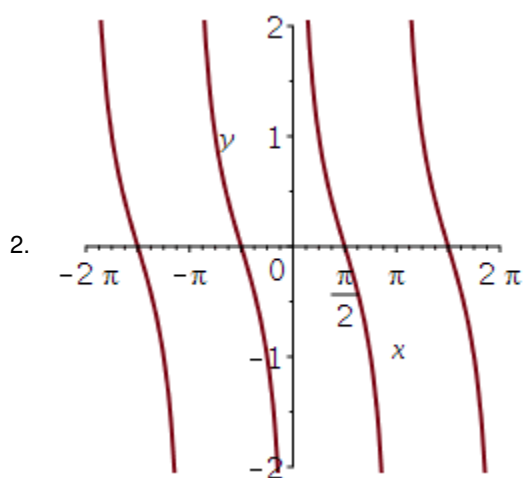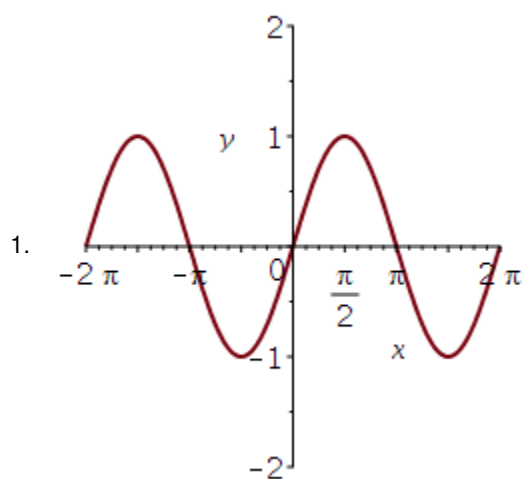
(b) $(\cot(x))^{-1} = $ _____

- $\cos^2(x)$ means $(\cos(x))^2$, not $(\cos)^2(x)$ (which doesn't even make sense). So write $(cos(x)) \wedge 2$ in MapleTA.
- $\tan x$ means $\tan(x)$; always use parentheses. $\tan x$ is generally interpreted as $\tan * x$ by MapleTA (which doesn't make sense).
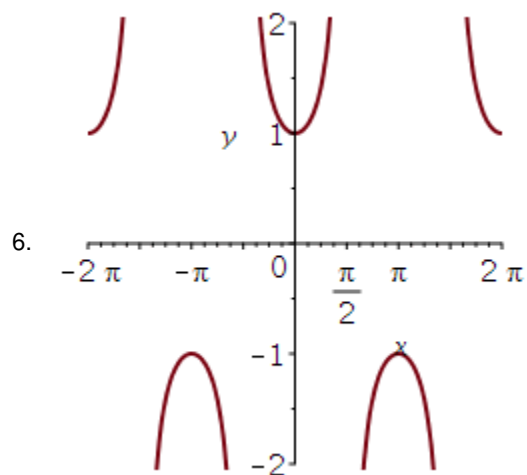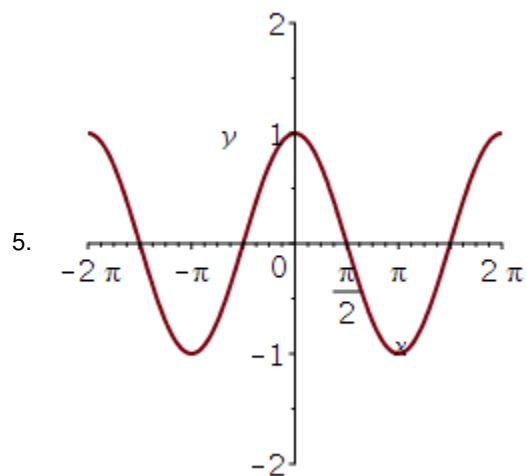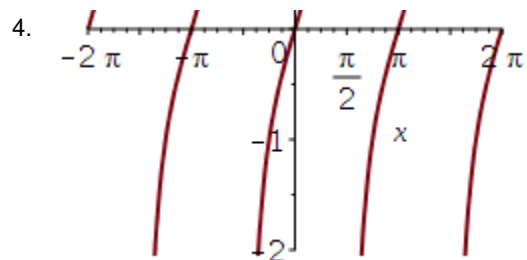
(c) $\sin^{-1}(\tan^2(\sec x))$ = _____

Question 5: (1 point)

Match each function to its graph.

| -- ∨ | $\csc(x)$ | -- ∨ | $\cot(x)$ | -- ∨ | $\sin(x)$ |
| -- ∨ | $\cos(x)$ | -- ∨ | $\sec(x)$ | -- ∨ | $\tan(x)$ |

1.

2.

3.

4.

5.

6.

Question 6: (1 point)

Match the sets that are equal.

_____

Question 7: (1 point)

The function

$$f(x) = |3 - x| + 5x$$

can be expanded as a piecewise-defined function, in the form

$$f(x) = \begin{cases} 3 + 4x & \text{if } a \geq 0 \\ C & \text{if } b < 0 \end{cases}$$

where each of the three expressions a, b and C may depend on x.

Please fill out the missing pieces from the piecewise function above for a, b and the function C.

$a =$ _____

$b =$ _____

$C =$ _____

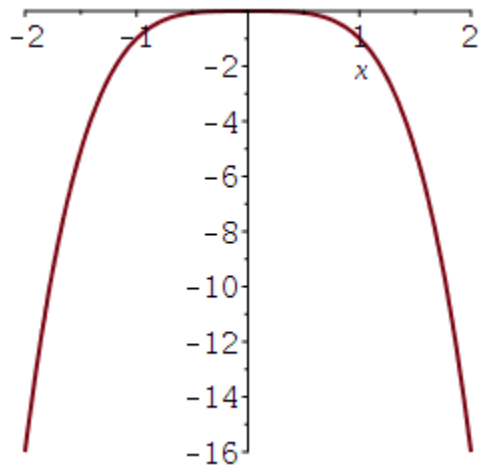**Question 8: (1 point)**

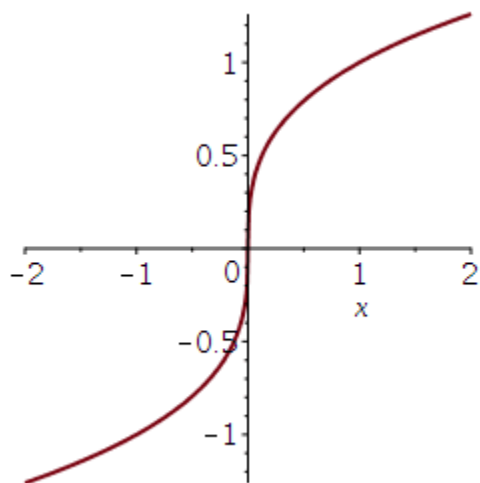Associate each function to its graph.

| -- ⌄ | $y = x^4$ | | -- ⌄ | $y = -x^4$ | | -- ⌄ | $y = x^3$ |

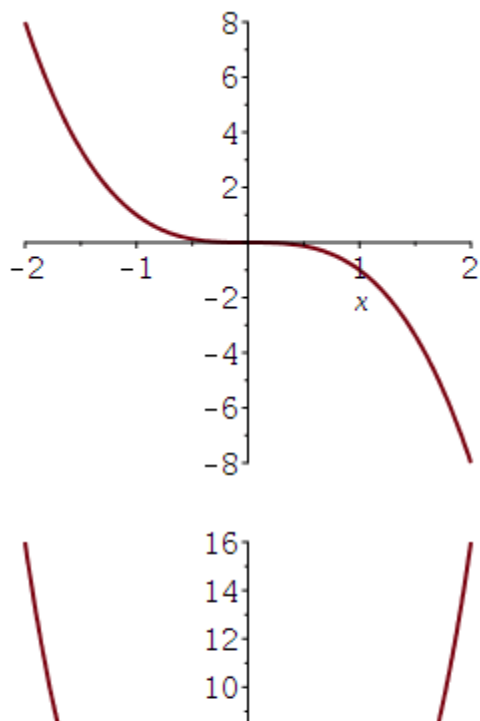| -- ⌄ | $y = x^{1/3}$ | | -- ⌄ | $y = -x^{1/3}$ | | -- ⌄ | $y = -x^3$ |

1.
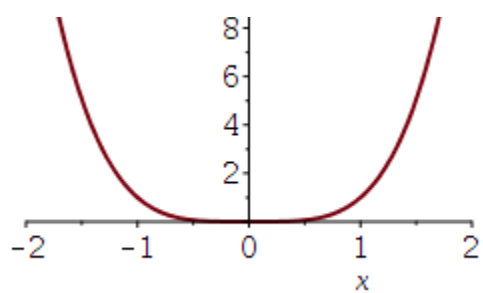

2.
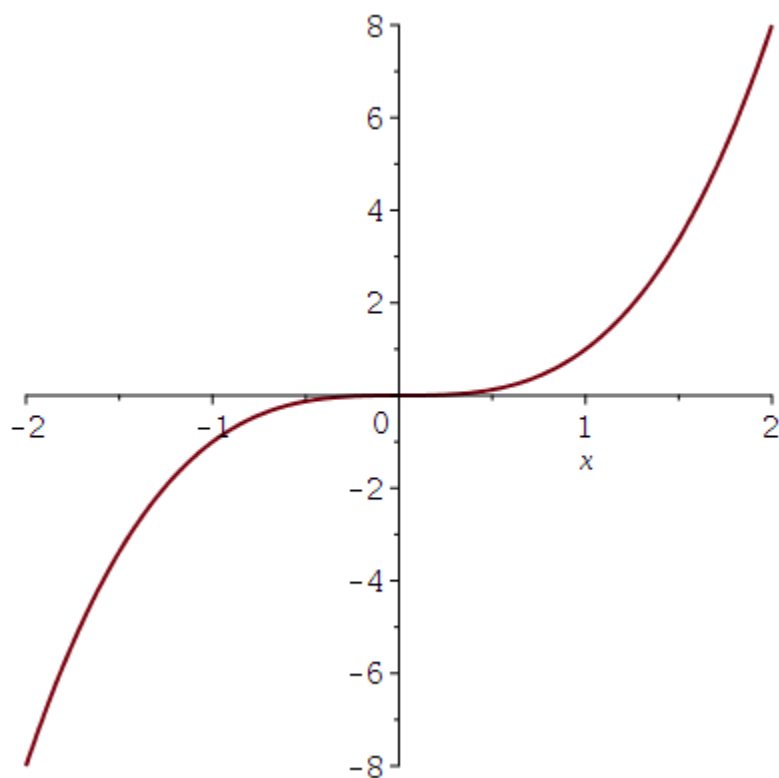

3.
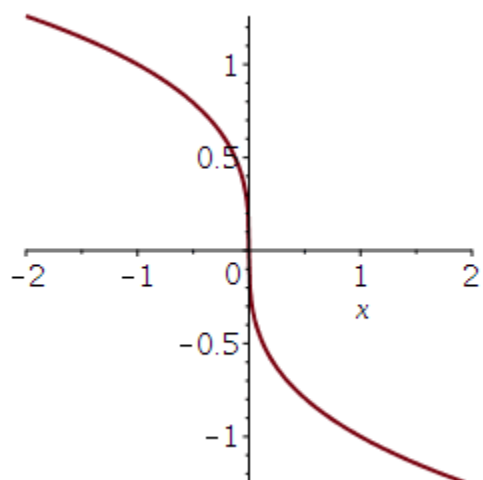
4.

5.

6.

Question 9: (1 point)

Find the inverse function f^{-1} of the function

$$f(x) = \frac{4x + 7}{8x + 3}$$

$f^{-1}(x) =$ _____

Question 10: (1 point)

Example: if f is a function and we want a new function g so that the graph of g is obtained from that of f by stretching it vertically by a factor of 3, then we should choose $g(x) = 3f(x)$.

Suppose we have a function f.

We want a formula for a new function g so that its graph is exactly the result of :

- shifting the graph of f by 11 units downward, and
- then shifting it by 30 units to the left.

What is g?

Answer $g(x) =$ _____

FORMATTING: Your answer should be a formula that includes the function f.

Question 11: (1 point)

Find the value of the composed function at the given point.

If $f(x) = 2x - 1$ and $g(x) = 4x + 3$, then
$(f \circ g)(0) =$ _____

Question 12: (1 point)

A function f is **even** if for each x in its domain, we have $f(-x) = f(x)$.
Which of the following functions are even?

  (a) $p(x) = xe^{5|x|}$

  (b) $g(x) = -2x^3 + 7x - 6$

  (c) $h(x) = |x| + x^2$

  (d) $f(x) = x^4 + 5x^2 - 4$

  (e) $k(x) = e^{-x}$

  (f) $m(x) = x^4 + (x+2)^2 - 5$

Question 13: (1 point)

Solve for x in the equation

$$4^{x-2} = 16^{x+4}.$$

Answer: $x =$ _____

Question 14: (1 point)

Each of the expressions below represents a function of x , for $x > 0$. Assign to each a simplified expression which is equivalent for all $x > 0$.

[-- ▼] $\ln\left(\left(e^x\, e^3\right)^2\right)$ [-- ▼] $\ln\left(\dfrac{3^x\, 6^{2x}}{2^{4x}}\right)$ [-- ▼] $e^{2\ln(x+3)}$

[-- ▼] $e^{\ln(x)} + \ln(3)$ [-- ▼] $\ln\left(\dfrac{e^{x\ln(2)}}{2}\right)$

1. $(x+3)^2$

2. $3x$

3. $2\,(x+3)$

4. $(x-1)\,\ln(2)$

5. $x\ln(27/4)$

Question 15: (1 point)

Let

$$f(x) = \sqrt{\ln(x+4)}.$$

a) What is the domain of $f(x)$?

$[-4, \infty)$

[ ]

$(-4, \infty)$

[ ]

$(-3, \infty)$

[ ]

$[-3, \infty)$

[ ]

$(-\infty, 4)$

[ ]

b) What is the range of $f(x)$?

$[-4, \infty)$

[ ]

$[0, \infty)$

[ ]

$(0, \infty)$

[ ]

$(-\infty, \infty)$

[ ]

$(-\infty, -4)$

[ ]