Thursday 10/01/20

Worksheet #3 Solutions

**Instructions：**Put the first and last name of everyone in your workgroup at the top of your paper. Everyone is to do their own worksheet but only one from each group is graded with the score shared. Be sure to show your work and explain your reasoning.

1. Find equations of the tangent line and normal line to the curve at the given point.

Hint: for a function f(x) and point (a,b), if f(a)=b and we need to find the tangent line and normal line for the function f(x) at that points, using the following formula:

**Tangent line**:

**Normal line**:

(a). + 2, (0,2)

When so k1= 2

Because the point (0,2) should be on the tangent line, so the equation: +2

The normal line is perpendicular to the tangent line, so

Because the point (0,2) should be on the normal line, so the equation:

(b). , (1,1)

For the point (1,1),

When

Because the point (1,1) should be on the tangent line, so the equation:

The normal line is perpendicular to the tangent line, so

Because the point (1,1) should be on the normal line, so the equation:

(c).

We know

Therefore, for the tangent line, that is: .

For the normal line, that is:

(d).

We know . And .

Therefore, for the tangent line, that is:

For the normal line, that is:

2. If f is a differentiable function, find an expression for the derivative of each of the following functions.

(a).

Differentiate both sides with respect to x

Use the product Rule

(b).

(c).

(d).

3. Find , where

**Hint: Instead of finding first, let be the numerator and the denominator of and compute from , , , and .**

4. Find and .

5. (a) If is a positive integer, prove that

[Product Rule]

[Addition formula for cosine]

(b) Find a formula for the derivative of that is similar to the one in part (a).

[Product Rule]

[Addition formula for sine]

6. Find the limit

(1)

Using the equation:

(2)

Using the equations and

7. If , find the value of

For this problem, we set h(x)=sec(x). For this function, f(x) means the derivative of h(x). Because if we intend to get the derivative of h(x), according to the definition of derivative, that is:

Do the substitute by using , we have:

=

Therefore, =. Therefore,

For the graph, that is:

图示

描述已自动生成

8. Find the derivative of the functions

()

Here are the steps:

表格

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手机屏幕截图

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9. If , then calculate .

Hint: Express your answer using factorial notation:

Solution:

Since we know . We can find the sequencing：

.

.

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Therefore,