Exponential Functions

GROUP MEMBERS:

1. _____________________________
2. _____________________________
3. ______________________________
4. ______________________________

**Group Roles:**

Reader – she reads the worksheet to the group. (Person 2)

Leader – makes sure the group stays on task, follows directions and that all members are getting to participate. (Person 3)

Questioner – the one person in the group who can ask the professor questions. (Person 4)

Reporter – person who will report the group's findings. (Person1)

**Goal:** To graph exponential functions.

**Instructions:**

**Part 1: Individual Work** Each person gets their own sheet and fills in the table of values for a different exponential function: either $2^x, 3^x, 2^{-x} = \frac{1}{2^x}, 3^{-x} = \frac{1}{3^x}$. Then each person graphs their function.

**Part 2: Group Work.** When everyone is done their individual work, come back together as a group. In one picture, graph all four exponential functions. Each person graphs their own function and explains how they got it. Do not worry about plotting the exact points; just show the general shape. Label the graphs.

1. Graph $y = 2^x$  
2. Graph $y = 3^x$  
3. Graph $y = 2^{-x} = \frac{1}{2^x}$  
4. Graph $y = 3^{-x} = \frac{1}{3^x}$
Group Discussion:

When \( x > 0 \): which function is greater, \( 2^x \) or \( 3^x \)?

When \( x < 0 \): which function is greater, \( 2^x \) or \( 3^x \)?

When \( x > 0 \): which function is greater, \( 2^x \) or \( 3^x \)?

When \( x < 0 \): which function is greater, \( 2^x \) or \( 3^x \)?

Add the following functions to your graph above. Label the graphs.

\[
y = f(x) = -2^x \\
y = f(x) = -2^x
\]
Fill in the table for the function $y = f(x) = \ldots$. Then graph the function.

<table>
<thead>
<tr>
<th>$x$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>-1</th>
<th>-2</th>
<th>-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>$f(x)$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Take the derivatives of the following functions:

a. Person 1: $e^{2x}$

b. Person 2: $e^{7x}$

c. Person 3: $e^{x^2}$

d. Person 4: $e^{\sin(x)}$