Graph transformations and parameter experiments

6 questions | 14 marks

Equivalent correct methods earn the corresponding marks.

1. Find the y-intercept of $y = 2^x + 4$. [2 marks]

$2^0 + 4 = 5$.

Answer: $(0, 5)$

2. State the shift from $y = 3^x$ to $y = 3^{x+2}$. [2 marks]

The inside change $x + 2$ gives an earlier input.

Answer: Left 2 units

3. State the range of $y = 2^x - 7$. [2 marks]

The exponential part is positive, so the result exceeds -7.

Answer: $y > -7$

4. Find the intercept and asymptote of $y = -3(2^x) + 6$. [3 marks]

At zero, $-3 + 6 = 3$; the vertical shift sets the asymptote.

Answer: $(0, 3)$ and $y = 6$

5. Compare $y = 2^x$ with $y = 2^{x-1}$ at $x = 0, 1, 2$. Give the outputs of the second graph. [2 marks]

Substitute the stated inputs; each is half the original output.

Answer: $\frac{1}{2}, 1, 2$

6. Explain why $y = 2^x + 3$ does not have consecutive output ratio 2, even though its exponential part does. [3 marks]

At $x = 0, 1, 2$, outputs are $4, 5, 7$, whose ratios are not constant. Distances above the asymptote $y = 3$ are $1, 2, 4$.

Answer: The constant shift changes output ratios.