Questions

Sequential updates

Sequential updates: Consider the following SystemVerilog code:

```
always_ff @(posedge clk) begin
    x <= x + v;
    if (x > 30) begin
        v <= -10;
    end else if (x < 0) begin
        v <= 10;
    end
end
```

Starting from $(x, v) = (15, 10)$, what are the values of (x, v) for the next 5 clock cycles?

Solution: The first 5 clock cycles for (x, v) are:

$$(15, 10) \rightarrow (25, 10) \rightarrow (35, 10) \rightarrow (45, -10) \rightarrow (35, -10) \rightarrow (25, -10)$$

Simple integral

Evaluate the following integral, where the integrand is $3x^2 + 1$ and the limits of integration are 0 to 2:

$$\int_0^2 (3x^2 + 1) \, dx$$

Give your final answer as a simplified number.