How to find the equation of the tangent and the normal for these curves at the given point:
1) $f(x) = x + \frac{2}{x} - 1$, point $A(2,4)$

2) $g(x) = x^2 + \frac{3}{e^x} + 2$, point $B(0,1)$

Solution

General formula for tangent line:

$$y_t = y_0 + y_0'(x - x_0)$$

General formula for normal:

$$y_n = y_0 - \frac{1}{y_0'}(x - x_0)$$

1) $f'(x) = 1 - \frac{2}{x^2}$

$f'(2) = 1 - \frac{2}{4} = 0.5.$

So ${y_t}^{f(x)} = 4 + 0.5(x - 2) = 0.5x + 3$ and ${y_n}^{f(x)} = 4 - 2(x - 2) = 8 - 2x.$

2) $g'(x) = 2x - \frac{3}{e^x}$

$g'(0) = -3.$

So ${y_t}^{g(x)} = 1 - 3(x - 0) = 1 - 3x$ and ${y_n}^{g(x)} = 1 + \frac{1}{3}(x - 0) = \frac{1}{3}x + 1.$

Answer

${y_t}^{f(x)} = 0.5x + 3$ and ${y_n}^{f(x)} = 8 - 2x.$

So ${y_t}^{g(x)} = 1 - 3x$ and ${y_n}^{g(x)} = \frac{1}{3}x + 1.$