Selected Problems Section 10.2

15 $f(x) = -2 \ln x + x^2 - 4$

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

22 $f(x) = \ln x^8 = 8 \ln x$

$f'(x) = \frac{8}{x}$

31 $f(x) = 3 + \ln x$ Find equation of tangent line at $x = 1$

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

$f'(1) = 1 = m$ $f(1) = 3 + \ln 1 = 3$

Using point-slope form

$(y - 3) = 1(x - 1)$

$y = x + 2$

Extra Credit Section 4.3 Using Gauss Jordan

50 $\begin{bmatrix} 2 & 6 & 15 & -12 \\ 4 & 7 & 13 & -10 \\ 3 & 6 & 12 & -9 \end{bmatrix}$ $\begin{matrix} \frac{1}{2}R1 \\ -2R1+R2 \\ \frac{1}{3}R3 \end{matrix}$ $\begin{bmatrix} 1 & 3 & \frac{15}{2} & -6 \\ 0 & -5 & -17 & 14 \\ 1 & 2 & 4 & -3 \end{bmatrix}$

$\begin{matrix} R1 \\ -\frac{1}{5}R2 \\ R3-R1 \end{matrix}$ $\begin{bmatrix} 1 & 3 & \frac{15}{2} & -6 \\ 0 & 1 & 17/5 & -\frac{14}{5} \\ 0 & -1 & \frac{8}{2}-\frac{15}{2}=-\frac{7}{2} & -3+6=3 \end{bmatrix}$ $\begin{matrix} -3R2+R1 \\ R2 \\ R2+R3 \end{matrix}$ $\begin{bmatrix} 1 & 0 & \frac{-3(17)}{5}+\frac{15}{2}=-\frac{27}{10} & \frac{3(14)}{5}-6=\frac{12}{5} \\ 0 & 1 & 17/5 & -14/5 \\ 0 & 0 & \frac{17}{5}-\frac{7}{2}=-\frac{1}{10} & -\frac{14}{5}+3=\frac{1}{5} \end{bmatrix}$

$\begin{matrix} R1 \\ R2 \\ -10R3 \end{matrix}$ $\begin{bmatrix} 1 & 0 & -\frac{27}{10} & 12/5 \\ 0 & 1 & 17/5 & -14/5 \\ 0 & 0 & 1 & -2 \end{bmatrix}$ $\begin{matrix} \frac{27}{10}R3+R1 \\ -17/5R3+R2 \\ R3 \end{matrix}$ $\begin{bmatrix} 1 & 0 & 0 & -\frac{27}{5}+\frac{12}{5}=-3 \\ 0 & 1 & 0 & +\frac{34}{5}-\frac{14}{5}=4 \\ 0 & 0 & 1 & -2 \end{bmatrix}$

$X = \begin{bmatrix} -3 \\ 4 \\ -2 \end{bmatrix}$ $\begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix} = \begin{bmatrix} -3 \\ 4 \\ -2 \end{bmatrix}$