Problem #1:  Find the derivative of each function.

a) $f(x) = 4x^3 + x - 7$

b)  $f(x) = \frac{x + x^2}{4x - 11}$

c)  $f(x) = (5x^2 - x)(11x + \sqrt{x})$

d) $f(x) = \tan x - 3 \csc x$

e) $f(x) = \ln \frac{(2x+5)^4}{(x-3)^2}$

Problem #2: Find the equation of the tangent line to $y = 7x^2 - \dfrac{9}{x}$ at $x = 1$.

Problem #3. Find all values of $x$ where $y = x^3 - 3x^2 - 24x + 2$ has an absolute maximum or minimum on the interval $[-3, 10]$.

**This problem requires material we have not yet covered.**
**Problems like this will not be on the midterm.**

Problem #4: Find $\frac{dy}{dx}$ if $3x^2 + xy - y^4 = 1$.

Problem #5: Find the equation of the tangent line to $2\sin x - \cos y = \sqrt{2}$ at $(\frac{\pi}{4}, \frac{\pi}{2})$.

Problem #6: Find $\dfrac{dy}{dx}$ if $y = \tan^{-1}(x-1)$

Problem #7. Find all $x$-values of $f(x) = x^{1/3} - \dfrac{x^{4/3}}{8}$ for which either $f'(x) = 0$ or $f'(x)$ is not defined.

Problem #8:  Find $\frac{dy}{dx}$:

a)  $x^2 y^2 - 4y^3 = 1$

b)  $y = xe^x$