2.3 – Differentiation Formulas
2.4 – Derivatives of Trigonometric Functions

Be sure to follow College Algebra formatting guidelines in your work. They're the same for us as they are for College Algebra, except we're "2410" and not "1340," so "2410" in the top left corner of your work, not "1340."

1. (5 pts) Let $f(x) = x^2 + 3x - 7$. Use the rules of differentiation to do what is asked.

   a. Differentiate $f(x)$ with respect to x.

   b. Differentiate $f(x)$ with respect to z.

   c. Find $\dfrac{dy}{dx}$.

2. (5 pts) Find the equation of the tangent line $L_{-2}(x)$ to $f(x)$ from #1 at $x_1 = -2$.

3. (5 pts) Sketch the graph of $f(x)$ and $L_{-2}(x)$ together on the same set of coordinate axes. Label key points from left to right with the letters A, B, C, etc. Key points are x- and y-intercepts, vertex, and the point $(x_1, y_1) = (x_1, f(x_1)) = (-2, f(-2))$, whatever $f(-2)$ is.

4. Use the differentiation formulas to differentiate the following functions. **Do not simplify**.

   a. (5 pts) $F(y) = \left(\dfrac{1}{y^2} + \dfrac{2}{y^5}\right)(y^3 - y^7)$

   b. (5 pts) $g(\theta) = \theta^2 \cos(\theta)$

   c. (5 pts) $H(x) = \dfrac{x^2 + 3x - 7}{x^3 + 1}$

   d. (5 pts) $Q(\omega) = \dfrac{\omega^2 \tan(\omega)}{\cos(\omega) + \omega}$

5. (5 pts) Find an equation of the tangent line to $y = \dfrac{5x}{x^2 - 4}$ at $x = 3$.

6. **Bonus (5 pts)** Sketch the graph of the equation in #5. Show all intercepts and asymptotes.

7. **Bonus (5 pts)** Add the tangent line from #5 to your sketch for #6. Label everything nicely.