1. (45 points) Compute the following derivatives. You do not have to simplify your answers.

(a) \( y = 4x^5 - 9x^3 + 7x^2 - 4x + 3 \)

\[ y' = \]

(b) \( y = 2x^{-5} + 3\pi^{-4} \)

\[ y' = \]

(c) \( A(t) = \frac{4}{t^3} - \frac{7}{t^6} \)

\[ A'(t) = \]

(d) \( y = \cos(x) \)

\[ y' = \]

(e) \( y = \sin(x) \)

\[ y' = \]
(f) \( y = \tan(x) \)
\[
y' = \]

(g) \( y = \sec(x) \)
\[
y' = \]

(h) \( P(t) = 3(t^2 + t + 1)(t^4 + t^2 + 3) \)
\[
P'(t) = \]

(i) \( R(t) = \frac{5t^3 + t}{4t^2 + 6} \)
\[
R'(t) = \]

(j) \( y = \cos(x^2) \)
\[
y' = \]

(k) \( y = \sin^2(2x) \)
\[
y' = \]
(l) \( y = \frac{x^2 + \tan(x)}{4 + \cos(x)} \)

\[ y' = \]

(m) \( M(t) = 7(x^4 - 3x^2 + 6)^{11} \)

\[ M'(t) = \]

(n) \( y = \left( \frac{x}{x+1} \right)^3 \)

\[ y' = \]

(o) \( D_t \left( \frac{\sin t}{\cos 2t} \right)^3 = \)

(2) (10 points) Compute the following limits.

(a) \( \lim_{x \to 3} \frac{x^2 + 4}{x + 5} = \)

(b) \( \lim_{t \to 2} \frac{t^2 - t - 2}{t - 2} = \)
(c) \( \lim_{\theta \to 0} \frac{1 - \cos \theta}{\theta} = \) 

(d) \( \lim_{x \to 0} \frac{\sin(3x)}{2x} = \) 

(3) (5 points) What is the equation of the tangent line to \( y = 3x^2 - 4x + 1 \) at the point where \( x = -2? \)

(4) (10 points) Let \( y = f(x) \) have the following graph.

(a) At which of the labeled points is \( f'(x) > 0? \)

(b) At which of the labeled points is \( f'(x) < 0? \)

(c) At which of the labeled points is \( f'(x) = 0? \)
(5) (10 points)
(a) State what it means for a function to be continuous.
(b) State the Intermediate Value Theorem.
(c) Show that the equation \( \cos(2x) - x^2 = 0 \) has at least one solution between \( x = 0 \) and \( x = 2 \).

(6) (10 points)
(a) State the definition of derivative in terms of a limit.
(b) Use the definition of the derivative to compute \( f'(8) \) where \( f(x) = \sqrt{2x} \).
(7) (5 points) A ball rolls down a long plane so that its distance $s$ form its starting point after $t$ seconds is $s = 3t^2 + 2t$ feet. When is its instantaneous velocity 14 feet per second.

(8) (5 points) What is the period and amplitude of the function $f(t) = 2 - 3\cos(4t)$?

Period = 

Amplitude = 