1. (20 points) Let $p(x) = x^5 - 2x + 1$ and let $q(x) = (x^3 + 2)^2$. Compute:

(a) $q(-1)$
(b) $q(a + b)$
(c) $p \circ q(-1)$
(d) $q \circ p(x)$

2. (10 points) Find the equation of the line through $(5, 4)$ and $(7, 0)$.

$y = -2x + 14$

3. (10 points) Find the points of intersection of the curves $y = x^3 + 2x$ and $y = 3x^2$.

$(0, 0), (1, 3), \text{ and } (2, 12)$

4. (10 points) In the box below, write the definition of $f'(x)$.

$$f'(x) = \lim_{h \to 0} \frac{f(x + h) - f(x)}{h}$$

5. (20 points) From the definition compute $f'(x)$ if $f(x) = x^2 - 3x + 2$.

$2x - 3$
6. (20 points) Find the equation of the tangent line to \( y = x^2 - 3x + 2 \) at the point where \( x = -1 \).

\[
y - 6 = -5(x + 1) \quad \text{or} \quad y = -5x + 1
\]

7. (35 points) The graph \( y = f(x) \) is pictured below.

![Graph of \( y = f(x) \)]

(a) What is the domain of \( f \)? \([0, 6) \cup (7, 11]\)

(b) What is the range of \( f \)? \((-1, 2] \cup [3, 6)\)

(c) What is \( f(5) \)? \(3\)

(d) How many solutions are there to \( f(x) = 1 \)? \(2\)

(e) On the graph, draw the tangent line to \( y = f(x) \) through the point where \( x = 3 \).

(f) Estimate \( f'(3) \). \(-1\)

(g) Find a solution to \( f'(x) = 0 \). \(x = 2, 5, \text{or} 9\)
8. (50 points) Find the derivatives of the following functions.

(a) \( f(x) = x^3 + 2x^2 + 3x + 4 \) \( \quad 3x^2 + 4x + 3 \)

(b) \( f(x) = \frac{7}{8\sqrt{x}} \) \( \quad -\frac{7}{16} \cdot x^{-\frac{3}{2}} \)

(c) \( f(x) = (\sqrt{x^3 + 2x^2})^3 \) \( \quad \frac{3}{2} \cdot (x^3 + 2x^2)^{\frac{1}{2}} \cdot (3x^2 + 4x) \)

(d) \( f(x) = (x - 2)(x + 2) \) \( \quad 2x \)

(e) \( f(x) = ((6x + 5)^4 + 3)^2 \) \( \quad 2((6x + 5)^4 + 3) \cdot 4(6x + 5)^3 \cdot 6 \)