1. Let \( f(x) = e^x - 1 - 2x \).
   
   (a) Find any extrema of \( f(x) \), and classify them by the First Derivative Test.

   10 points

   (b) Find the absolute maximum and absolute minimum of \( f(x) \) on the interval \([0,1]\).

   5 points

2. Find all points of inflection of \( g(x) = 9x^{5/3} - 5x^2 \).

   10 points
3. Given the following, sketch the graph of $f(x)$:

(a) $f(-4) = 1/2$, $f(-3) = 1$, $f(-2) = 0$, $f(-1) = -1$, $f(0) = 0$, $f(2) = 0$

(b) $\lim_{x \to -\infty} f(x) = 0$, $\lim_{x \to -\infty} f(x) = 1$, $\lim_{x \to -1} f(x) = +\infty$, $\lim_{x \to 1^+} f(x) = -\infty$

(c) $f'(x) > 0$ on $(-\infty, -3) \cup (-1, 1) \cup (1, \infty)$, $f'(x) < 0$ on $(-3, -1)$, $f'(-3) = 0$, $f'(-1) = 0$

(d) $f''(x) > 0$ on $(-\infty, -4) \cup (-2, 1)$, $f''(x) < 0$ on $(-4, -2) \cup (1, \infty)$

4. Evaluate the following limits:

(a) $\lim_{x \to 1} \frac{e^{x-1} - x^2 + x - 1}{x^2 - 2x + 1}$

(b) $\lim_{x \to -\infty} (1 + e^x)e^{-x}$
5. Suppose that \( f(3) = 6 \) and that \( f'(x) \leq -2 \) for all \( x \).

Use the *Mean Value Theorem* to show that \( f(1) \geq 10 \).

6. Find the point on the curve \( y = \sqrt{x} \) which is closest to \((3,0)\)
7. A particle moves on the $x$-axis with acceleration $a(t) = 6t - 10 \text{ m/s}^2$ for $0 \leq t \leq 10$, with initial position $s(0) = 0$ and initial velocity $v(0) = 6 \text{ m/s}$.

Show that the particle is at the origin at $t = 2 \text{ s}$, moving at $2 \text{ m/s}$ to the left.

8. Find the most general antiderivatives:

(a) $f(t) = \frac{t^3 + 2t^2 - 5t + \sqrt{t}}{t^2}$

(b) $g(x) = \sin(x) + e^x - \sec^2(x) + \frac{1}{\sqrt{1 - x^2}}$