1. [10 pts. each] Evaluate the limit. If a limit does not equal a real number, state whether it equals $-\infty$ or $+\infty$ where appropriate, otherwise answer with "DNE" (Does Not Exist).

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

   (b) $\displaystyle\lim_{x \to -1} \frac{x^2 - 4x}{x^2 - 3x - 4}$

   (c) $\displaystyle\lim_{x \to 7} \frac{\sqrt{x+2} - 3}{x - 7}$

   (d) $\displaystyle\lim_{x \to 3} (2x + |x - 3|)$

2. [10 pts.] If $2x \le g(x) \le x^4 - x^2 + 2$ for all x, evaluate $\displaystyle\lim_{x \to 1} g(x)$.

3. [10 pts.] Prove that $\displaystyle\lim_{x \to 0} x^4 \cos\frac{2}{x} = 0$ using the Squeeze Theorem.

4. [15 pts. each] Prove the statement using the ϵ-δ definition of limit.

   (a) $\displaystyle\lim_{x \to 3} (2x + 7) = 13$

   (b) $\displaystyle\lim_{x \to 2} (5 - 7x) = -9$

5. [10 pts.] Explain why the function is discontinuous at 1.

   $$f(x) = \begin{cases} 1 - x^2, & \text{if } x < 1 \\ 1/x, & \text{if } x \ge 1 \end{cases}$$

6. [15 pts.] Find the numbers at which φ is discontinuous. At which of these numbers is φ continuous from the right, from the left, or neither?

   $$\varphi(x) = \begin{cases} x + 1, & \text{if } x \le 1 \\ 1/x, & \text{if } 1 < x < 3 \\ \sqrt{x - 3}, & \text{if } x \ge 3 \end{cases}$$

7. [15 pts.] Use the Intermediate Value Theorem to prove that the equation $\sqrt{x - 5} = \dfrac{1}{x + 3}$ has at least one real root.

8. [15 pts.] Find an equation of the tangent line to the curve $y = \dfrac{x - 1}{x - 2}$ at the point $(3, 2)$.

9. [15 pts.] If a ball is thrown into the air with an initial velocity of 40 ft/s, its height (in feet) after t seconds is given by $y = 40t - 16t^2$. Find the velocity when $t = 2$.