

You must show all work clearly to receive any points for a problem. **Circle your final answers.**  
You have 15 minutes. No notes or calculators are allowed.

**1.** (30 points) Analyze the function algebraically. In particular, find the following. (If there are none, write “none”.)

$$f(x) = \frac{4x - 7}{3x + 14}$$

- Express the domain of the function using interval notation.
- Find the vertical asymptote(s).
- Find the hole(s).
- Find the horizontal asymptote(s).
- Sketch a complete graph of the function.

**2.** (20 points) Solve the inequality.

$$|x^2 - 6x + 8| \leq 2$$

**3.** (30 points) Analyze the function algebraically. In particular, find the following. (If there are none, write “none”.)

$$g(x) = \frac{x^2 - 64}{x^3 - 16x^2 + 64x}$$

- Express the domain of the function using interval notation.
- Find the vertical asymptote(s).
- Find the hole(s).
- Find the horizontal asymptote(s).

**4.** (20 points) Simplify the following expressions. Assume that all letters represent positive real numbers.

- $\sqrt{3}\sqrt{27}$
- $\sqrt[3]{40} + \sqrt[3]{135}$
- $\sqrt{125x^{-2}y^8}$
- $\frac{\sqrt{a^{-4}b^{16}}}{\sqrt{a^8b^{-3}}}$