1. Factor: (a) $x^2 + x - 2$ (b) $x^2 - 9$

2. Write the **slope intercept form** of the equation of a line that passes through $(-1, 4)$ and $(2, 5)$

3. Given $f(x) = \begin{cases} \dfrac{x^2 - 2x + 1}{x - 1} & \text{if } x < 1 \\ 0 & \text{if } x \geq 1 \end{cases}$

   Find

   (a) $\displaystyle\lim_{x \to 1^-} f(x) =$

   (b) $\displaystyle\lim_{x \to 1^+} f(x) =$

(c) $\lim\limits_{x \to 1} f(x) =$

(d) $f(1) =$

Is f continuous at $x = 1$? Justify your answer.

4. Let $f(x) = x^2 - 4\sqrt{x}$. Find the (instantaneous) rate of change of f at $x = 4$.

5. Find derivative of
   (a) $f(x) = \frac{1}{2}\sqrt{x} + x^2 - \sqrt{2}$

   (b) $g(x) = \dfrac{2}{x^2} - x^{-1} + \sqrt[5]{x}$

   (c) $h(x) = 2\sqrt{100 - x^2}$

6. Find the **second** derivative of
$$f(x) = (x^3 - 3)^{-1}$$

7. Given
$$f(x) = \frac{\sqrt{2x}}{x^2 - 1}$$

What is $f'(2)$?

8. The demand for VR-glasses is modeled by the function

$$p(x) = -x^2 - 4x + 64$$

where p is measured in dollars and x is measured in thousands of glasses.

   1. Find the average rate of change in the unit price of VR-glasses if the quantity demanded is between 0 and 5 thousand.

   2. What is the instantaneous change in the unit price of VR-glasses at a demand of 3 thousand units $(x = 3)$?

9. Given $f(x) = \sqrt{2x}$ and $g(x) = x^2 - x$. Compute the following (Simplify your answers if possible; but, don't combine anything in part (a)):

(a) $(f + g)(x) =$

(a) $(f - g)(x) =$

(b) $(fg)(x) =$

(c) $\left(\dfrac{f}{g}\right)(x) =$

(e) $(f \circ g)(x) =$

(f) $(g \circ f)(x) =$

(g) $(g \circ f)(2) =$