1. Fill in the blanks below.

   Assume a and c are fixed constants. Also, **assume** $\lim_{x\to a} f(x)$ **and** $\lim_{x\to a} g(x)$ **exist.**

   (a) $\lim_{x\to a} c =$ __________________________

   (b) $\lim_{x\to a} x =$ __________________________

   (c) $\lim_{x\to a} (f(x) + g(x)) =$ __________________________

      i. What do the rules above imply about $\lim_{x\to 12} (x + \pi)$?

   (d) $\lim_{x\to a} (f(x) - g(x)) =$ __________________________

   (e) $\lim_{x\to a} cf(x) =$ __________________________

      i. What do the rules above imply about $\lim_{x\to 5} 2x + 3$?

   (f) $\lim_{x\to a} f(x)g(x) =$ __________________________

   (g) $\lim_{x\to a} x^n =$ __________________________provided __________________________

   (h) $\lim_{x\to a} (f(x))^n =$ __________________________provided __________________________

   (i) $\lim_{x\to a} \dfrac{f(x)}{g(x)} =$ __________________________ provided __________________________

   (j) $\lim_{x\to a} \sqrt[n]{x} =$ __________________________provided ____

   (k) $\lim_{x\to a} \sqrt[n]{f(x)} =$ __________________________provided ____

2. If $\lim_{x \to \sqrt{2}} f(x) = 8$ and $\lim_{x \to \sqrt{2}} g(x) = e^2$, then evaluate

$$\lim_{x \to \sqrt{2}} \left(\frac{g(x)}{(3 - f(x))^2} + 2\sqrt{g(x)} \right)$$

3. Use the previous rules to evaluate (a) and explain why you *cannot* use the rules to evaluate (b).

(a) $\lim_{w \to -\frac{1}{2}} \frac{2w+1}{w^3}$

(b) $\lim_{t \to 1} \frac{t^2 + t - 2}{t^2 - 1}$

4. (One more super-useful rule!) If $f(x) = g(x)$ when $x \neq a$, then $\lim_{x \to a} f(x) \boxed{=} \lim_{x \to a} g(x)$ provided the limits exist. Use this rule *and what you know about zeros of polynomials* to evaluate

$\lim_{t \to 1} \frac{t^2 + t - 2}{t^2 - 1}$