

1. Fill in the blanks below. Assume  $a$  and  $c$  are fixed constants. (Note that these are all in your text but not in this order.) **Assume  $\lim_{x \rightarrow a} f(x)$  and  $\lim_{x \rightarrow a} g(x)$  exist.**

(a)  $\lim_{x \rightarrow a} c =$  \_\_\_\_\_

(b)  $\lim_{x \rightarrow a} x =$  \_\_\_\_\_

(c)  $\lim_{x \rightarrow a} (f(x) + g(x)) =$  \_\_\_\_\_

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

(d)  $\lim_{x \rightarrow a} (f(x) - g(x)) =$  \_\_\_\_\_

(e)  $\lim_{x \rightarrow a} cf(x) =$  \_\_\_\_\_

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

(f)  $\lim_{x \rightarrow a} f(x)g(x) =$  \_\_\_\_\_

(g)  $\lim_{x \rightarrow a} x^n =$  \_\_\_\_\_

(h)  $\lim_{x \rightarrow a} (f(x))^n =$  \_\_\_\_\_

(i)  $\lim_{x \rightarrow a} \frac{f(x)}{g(x)} =$  \_\_\_\_\_ provided \_\_\_\_\_

(j)  $\lim_{x \rightarrow a} \sqrt[n]{x} =$  \_\_\_\_\_

(k)  $\lim_{x \rightarrow a} \sqrt[n]{f(x)} =$  \_\_\_\_\_

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

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

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

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

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

4. (One more super-useful rule!) If

$$, \text{ then } \lim_{x \rightarrow a} f(x) = \lim_{x \rightarrow a} g(x)$$

5. Use this rule *and what you know about zeros of polynomials* to evaluate

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