

Chapter 12 and 14 Review

ALL PROBLEMS MUST WORKED AND COMPLETED ON SEPARATE PAPER OTHERWISE; THE REVIEW WILL NOT BE GRADED. SHOW ALL WORK FOR CREDIT. REVIEW IS DUE ON TEST DAY.

1. Complete the table of values (to 5 decimal places) and use the table to estimate the value of the limit.

a. $\lim_{x \rightarrow 4} \frac{\sqrt{x}-2}{x-4} =$

| | | | | | | |
|------|-----|------|-------|-------|------|-----|
| x | 3.9 | 3.99 | 3.999 | 4.001 | 4.01 | 4.1 |
| F(x) | | | | | | |

b. $\lim_{x \rightarrow 1} \frac{x-1}{x^3-1} =$

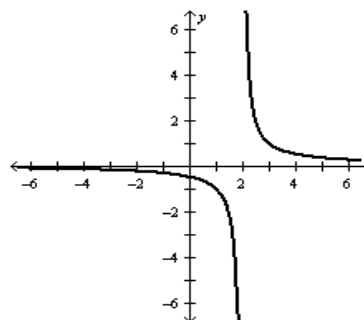
| | | | | | | |
|------|----|-----|------|-------|------|-----|
| x | .9 | .99 | .999 | 1.001 | 1.01 | 1.1 |
| F(x) | | | | | | |

2. For the function f whose graph is given, state the value of the given quantity if it exists.

a. $\lim_{x \rightarrow 2^+} f(x)$

b. $\lim_{x \rightarrow 2^-} f(x)$

c. $\lim_{x \rightarrow 2} f(x)$



3. Graph the piecewise-defined function and use your graph to find the values of the limes, if they exist.

a. $f(x) = \begin{cases} -x+3 & \text{if } x < -1 \\ 3 & \text{if } x \geq -1 \end{cases}$

b. $f(x) = \begin{cases} 2x+10 & \text{if } x \leq -2 \\ -x+4 & \text{if } x > -2 \end{cases}$

i. $\lim_{x \rightarrow -1^-} f(x)$

ii. $\lim_{x \rightarrow -1^+} f(x)$

iii. $\lim_{x \rightarrow -1} f(x)$

i. $\lim_{x \rightarrow -2^-} f(x)$

ii. $\lim_{x \rightarrow -2^+} f(x)$

iii. $\lim_{x \rightarrow -2} f(x)$

4. Suppose that $\lim_{x \rightarrow a} f(x) = -3$, $\lim_{x \rightarrow a} g(x) = 0$, and $\lim_{x \rightarrow a} h(x) = 8$. Find the value of the given limit.

a. $\lim_{x \rightarrow a} [f(x) + h(x)]$

b. $\lim_{x \rightarrow a} [f(x)]^2$

c. $\lim_{x \rightarrow a} \sqrt[3]{h(x)}$

d. $\lim_{x \rightarrow a} \frac{1}{f(x)}$

e. $\lim_{x \rightarrow a} \frac{f(x)}{h(x)}$

f. $\lim_{x \rightarrow a} \frac{g(x)}{f(x)}$

g. $\lim_{x \rightarrow a} \frac{f(x)}{g(x)}$

h. $\lim_{x \rightarrow a} \frac{2f(x)}{h(x) - f(x)}$

5. Evaluate the limit.

a. $\lim_{x \rightarrow 4} (5x^2 - 2x + 3)$

c. $\lim_{x \rightarrow 0} \frac{\sqrt{1+h} - 1}{h}$

b. $\lim_{x \rightarrow 0} \frac{(2+h)^3 - 8}{h}$

6. Find the slope of the tangent line to the graph of f at the given point.

a. $f(x) = 3x + 4$ at $(1, 7)$

c. $f(x) = \frac{1}{x^2}$ at $(-1, 1)$

b. $f(x) = 4x^2 - 3x$ at $(-1, 7)$

7. Find the derivative of the function at the given number.

a. $f(x) = 1 - 3x^2$ at 2

b. $f(x) = \frac{1}{\sqrt{x}}$ at 4

8. If an arrow is shot upward on the moon with a velocity of 58 m/s, its height (in meters) after t seconds is given by $H = 58t - 0.83t^2$.

a. Find the velocity of the arrow after one second.

b. Find the velocity of the arrow when $t = a$.

c. At what time t will the arrow hit the moon.

d. With what velocity will the arrow hit the moon.

9. Find the limit.

a. $\lim_{x \rightarrow \infty} \frac{2x+1}{5x-1}$

b. $\lim_{x \rightarrow \infty} \frac{x^2+2}{x^3+x+1}$

10. If the sequence is convergent, find its limit. If it is divergent, explain why.

a. $a_n = \frac{n^2}{n+1}$

b. $a_n = \frac{3}{n^2} \left[\frac{n(n+1)}{2} \right]$

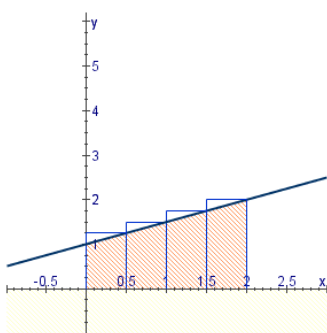
11. Find the area of the region that lies under the graph of f over the given interval.

a. $f(x) = 4x^3$, $0 \leq x \leq 2$

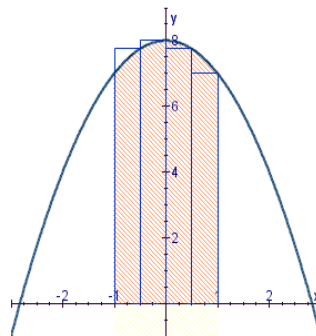
b. $f(x) = x + x^2$, $0 \leq x \leq 1$

12. Approximate the area of the shaded region under the graph of the given function by using the indicated rectangles. (The rectangles have equal width.)

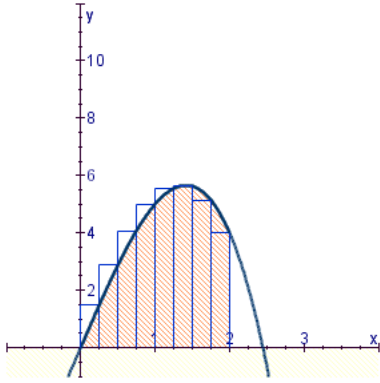
a. $f(x) = \frac{1}{2}x + 1$



b. $f(x) = 8 - x^2$



c. $f(x) = 6x - x^3$



13. Determine the common difference, the fifth term, the n th term, and the 100th term of the arithmetic sequence.

$$1, 6, 11, 16, \dots$$

14. Find the partial sum S_n of the arithmetic sequence that satisfies the given conditions: $a=1$, $d = 3$, $n=22$

15. Determine the common ratio, the fifth term, and the n th term of the geometric sequence.

$$2, \frac{8}{3}, \frac{32}{9}, \frac{128}{27}, \dots$$

16. Find the partial sum S_n of the geometric sequence that satisfies the conditions

$$a = \frac{2}{3}, r = \frac{1}{3}, n = 5$$

17. Use the Binomial Theorem to expand the expression $(2x + y)^5$

18. Find the term containing x^8 in the expansion of $(x + 3y)^{10}$.

19. Find the fifth term in the expansion of $(x - 2y)^7$