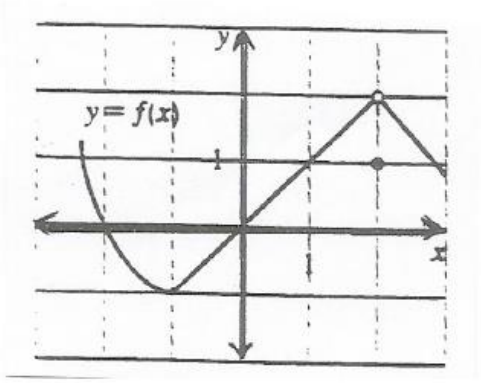
Limits Set 2

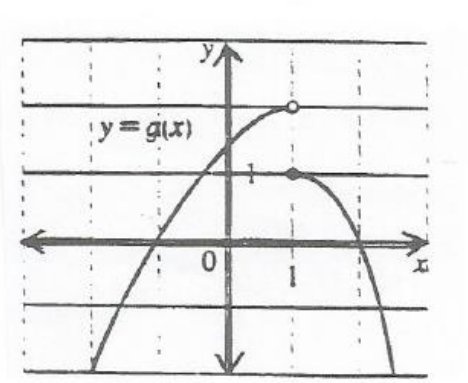
… Answers are after each page of problems

WORKSHEET 1 ON LIMITS

Work the following. No calculator.

1. The graphs of f and g are given. Use them to evaluate each limit, if it exists. If the limit does not exist, explain why.





(a) $\lim_{x\to 2}\left[f(x)+g(x)\right]$

(b) $\lim_{x\to 1}\left[f(x)+g(x)\right]$

(c) $\lim_{x\to 0}\left[f(x)g(x)\right]$

(d) $\lim_{x\to -1}\dfrac{f(x)}{g(x)}$

(e) $\lim_{x\to 2}x^3 f(x)$

(f) $\lim_{x\to 1}\sqrt{3+f(x)}$

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Answers

Worksheet 1 on Limits

1. (a) 2

   (b) dne

   (c) 0

   (d) undefined

   (e) 16

   (f) 2

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Find the following limits. Show all steps.

2. $\lim_{x\to 0}\dfrac{\sin(2x)}{x}$

3. $\lim_{x\to 0}\dfrac{\sin x}{2x^2-x}$

4. $\lim_{x\to 0}\dfrac{x+\sin x}{x}$

5. $\lim_{x\to 0}\dfrac{\sin^2 x}{x}$

6. $\lim_{x\to 0}\dfrac{3\sin(4x)}{\sin(3x)}$

7. $\lim_{x\to 0}\dfrac{x^2}{1-\cos x}$

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Answers

Worksheet 1 on Limits

2. 2
3. 1
4. 2
5. 0
6. 4
7. 2

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8. Graph $y=|x|$, $y=-|x|$, and $y=x\cos\left(\frac{50\pi}{x}\right)$ on the same graph over the x-interval from -1 to 1, and use the Squeeze Theorem to find $\lim_{x\to 0} x\cos\left(\frac{50\pi}{x}\right)$.

9. Sketch the graphs of $y=1-x^2$, $y=\cos x$, and $y=f(x)$, where f is any continuous function that satisfies the inequality $1-x^2\le f(x)\le\cos x$ for all x in the interval $\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$. What can you say about the limit of $f(x)$ as $x\to 0$? Explain your reasoning.

10. If $3x\le f(x)\le x^3+2$, evaluate $\lim_{x\to 1} f(x)$.

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Answers

Worksheet 1 on Limits

8. 0

9. $\lim_{x \to 0} f(x) = 1$ by the Squeeze Theorem.

10. $\lim_{x \to 1} f(x) = 3$ by the Squeeze Theorem.

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Evaluate. Show all steps.

11. $\lim_{x \to -3} \dfrac{x^2 - 2x - 15}{x^2 + 4x + 3}$

12. $\lim_{x \to 7} \dfrac{\sqrt{x+2} - 3}{x - 7}$

13. $\lim_{x \to 0} \dfrac{\dfrac{1}{5+x} - \dfrac{1}{5}}{x}$

14. $\lim_{x \to 4} \dfrac{x^3 - 64}{x - 4}$

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Answers

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11. 4

12. $\frac{1}{6}$

13. $-\frac{1}{25}$

14. 48