MATH 1401-001

Fall 2023 Chapter 2 Exam Review

Chapter 2 Exam: Thursday, September 7th

Review: Tuesday, September 5th

Instructor: Whitten

Instructions:

1. You will have a total of 1 hour and 15 minutes to complete this exam. The exam is worth 50 points.
2. **Calculators, electronic devices, scratch paper, and notecards are not allowed on this exam.**
3. Show ALL of your work. Partial credit can be awarded for work that is legible and mathematically correct.
4. Cheating of any kind on the exam will not be tolerated and will result in a grade of 0%. **A visible phone results in a zero on the exam.**
5. No trick questions!!! Make sure you understand the concepts on this review.
6. Take a deep breath, relax, and good luck!!

1. Given the function $f(x) = 6\sin(x)$, find the average rate of change of $f(x)$ on the interval $\left[\dfrac{\pi}{6}, \dfrac{\pi}{2}\right]$. Your final answer must be simplified, which means no fractions in your fraction.

2. Given the function $f(x) = 25 - x^2$, find the slope of the secant line, m_{sec}, on the interval $[2, 3]$.

3. If the position of an object in feet at time t in seconds is defined by the function $s(t) = t^2 - 4t + 3$, find the average velocity of the object on the interval $[2, 5]$. Include units in your final answer.

4. Given the graph of $f(x)$, answer the following:
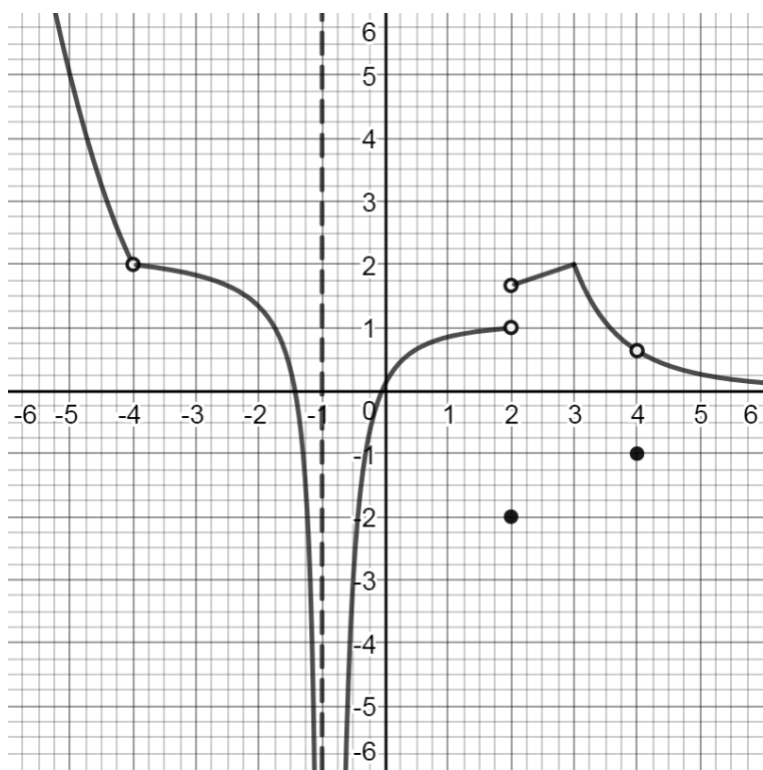
a. $\lim\limits_{x \to -4^-} f(x)$

b. $\lim\limits_{x \to -4^+} f(x)$

c. $\lim\limits_{x \to -4} f(x)$

d. $\lim\limits_{x \to -1} f(x)$

e. $\lim\limits_{x \to 2} f(x)$

f. $\lim\limits_{x \to 3} f(x)$

g. $\lim\limits_{x \to -\infty} f(x)$

h. $\lim\limits_{x \to \infty} f(x)$

i. $f(2)$

j. The function is not continuous at $x =$: _____

Evaluate the following limits:

5. $\displaystyle\lim_{x\to 1} \frac{x^2 - x}{x^2 + 2x - 3}$

6. $\displaystyle\lim_{x\to 2^+} \frac{1 - x}{x - 2}$

7. $\displaystyle\lim_{x\to -3} \frac{x^2 - 9}{x^2 + 9}$

8. $\displaystyle\lim_{x\to 4} \frac{x - 4}{\sqrt{x} - 2}$

9. $\displaystyle\lim_{x\to\infty} \frac{5 - x}{x + 8}$

10. $\displaystyle\lim_{x\to 0} \frac{\dfrac{2}{x+7} - \dfrac{2}{7}}{x}$

11. $\displaystyle\lim_{x\to\infty} \frac{x + 40000}{.01x^2 + 3x}$

12. $\displaystyle\lim_{x\to -\infty} \frac{4x^5 - x^2 + 5}{7 - x^2}$

13. $\displaystyle\lim_{x\to\infty} \left(3 - 2x^{-2}\right)$

14. $\displaystyle\lim_{x \to \infty} \frac{\cos^2 x}{x^2}$

15. $\displaystyle\lim_{x \to 0} \frac{\sqrt{49-x}-7}{x}$

16. $\displaystyle\lim_{x \to 4} 7$

Find all x-interval(s) where $f(x)$ is continuous:

17. $f(x) = 4 - 2x + x^4$

18. $f(x) = \sqrt{3 - 4x}$

19. $f(x) = \dfrac{2x - 1}{x^2 + 4x}$

20. $f(x) = \dfrac{\sqrt{x-3}}{x-6}$

21. $f(x) = \sqrt{x^3 - 4x^2 - 21x}$

22. $f(x) = \sec x$

23. Find all points of discontinuity, if any: $f(x)=\begin{cases} 3x-1, & x\le-2 \\ x^2-3, & -2<x<1 \\ 5\cos(x-1)-7, & x\ge1 \end{cases}$

24. Find the value of k so that $g(x)$ is continuous everywhere:

$$g(x) = \begin{cases} x^2 - 2x + 3\,, & x \le -2 \\ kx + 1, & x > -2 \end{cases}$$

25. True or False: $\displaystyle\lim_{x\to a} x\cdot f(x)=x\cdot\lim_{x\to a} f(x)$ _____

26. True or False: If $\displaystyle\lim_{x\to a} f(x)=L$, then $f(x)$ is continuous at $x=a$ _____

Evaluate:

27. $\displaystyle\lim_{x \to \infty} \frac{\sqrt{4x^6+11x^2+1}}{7x^3-\sqrt{x^6+3x^4+x^2+3}}$

28. $\displaystyle\lim_{x \to -\infty} \frac{\sqrt{4x^6+11x^2+1}}{7x^3-\sqrt{x^6+3x^4+x^2+3}}$

For Questions 29 – 36, let $f(x) = \dfrac{x^2+x-6}{x^2-4} = \dfrac{(x+3)(x-2)}{(x-2)(x+2)}$

29. $\displaystyle\lim_{x \to 2} f(x)$

30. $\displaystyle\lim_{x \to -2} f(x)$

31. $\displaystyle\lim_{x \to \infty} f(x)$

32. The **equation** of the horizontal asymptote of $f(x)$ is: _____

33. The **equation(s)** of the vertical asymptote(s) of $f(x)$ is/are: _____

34. Is there a hole in the graph of $f(x)$? _____ If so, at $x =$ _____

35. Does the function have a removable discontinuity? If so, it occurs at $x =$ _____

36. Use this information (and find the x-intercept) to make a sketch of $f(x)$.