Review homework

Friday, August 25, 2017 11:47 AM

pg. 97 #1, 5, 7, 9, 15-24, 28, 33, 36, 41, 43, 47, 54

1. $\lim_{x \to -2} x^3 - 2x^2 + 1 = -15$

5. $\lim_{x \to 0} \dfrac{\frac{1}{2+x} - \frac{1}{2}}{x}$

$= \lim_{x \to 0} \dfrac{2 - 2 - x}{2(2+x) \cdot x}$

$= \lim_{x \to 0} \dfrac{-x}{2(2+x) \cdot x}$

$= \lim_{x \to 0} \dfrac{-1}{2(2+x)}$

$= -\dfrac{1}{4}$

7. $\lim_{x \to \infty} \dfrac{x^4 + x^3}{12x^3 + 128} = \infty$

$\lim_{x \to -\infty} \dfrac{x^4 + x^3}{12x^3 + 128} = -\infty$

9. $\lim_{x \to 0} \dfrac{x \csc x + 1}{x \csc x}$

$= \lim_{x \to 0} \dfrac{\frac{x}{\sin x} + 1}{\frac{x}{\sin x}}$

$= \lim_{x \to 0} \dfrac{x + \sin x}{\sin x} \cdot \dfrac{\sin x}{x}$

$= \lim_{x \to 0} \dfrac{x}{x} + \dfrac{\sin x}{x}$

$= 1 + 1$

$= 2$

15. limit exists

16. limit exists

17. limit exists

18. does not exist

19. limit exists

20. limit exists

21. Continuous at $x = a$

22. Not continuous at $x = b$

23. Not continuous at $x = c$

24. Continuous at $x = d$

28. $f(x) = \dfrac{x-1}{x^2(x+2)}$ has vertical asymptotes at $x = 0, -2$

$\lim_{x \to 0^+} f(x) = -\infty$ $\quad$ $\lim_{x \to -2^+} f(x) = -\infty$

$\lim_{x \to 0^-} f(x) = -\infty$ $\quad$ $\lim_{x \to -2^-} f(x) = \infty$

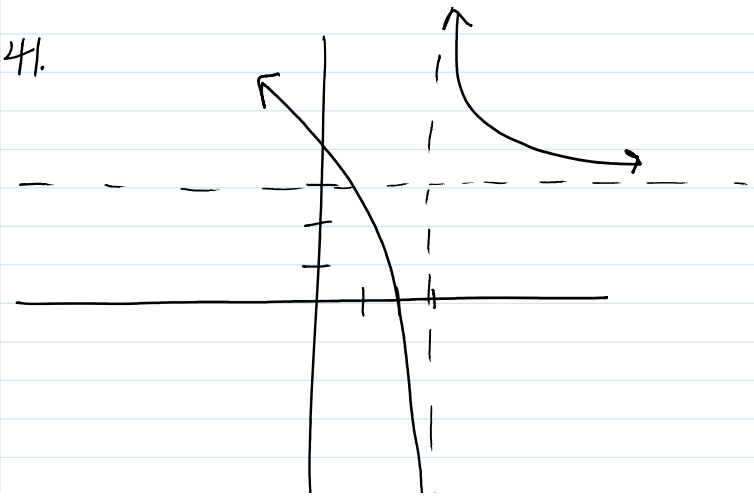
33. $f(x) = \dfrac{2x+1}{x^2 - 2x + 1}$ → a. end behavior model $g(x) = \dfrac{2}{x}$

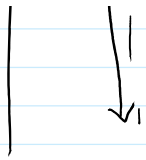
b. $y = 0$ is the horizontal asymptote

36. $f(x) = \dfrac{x^4 - 3x^2 + x - 1}{x^3 - x + 1}$ → a. end behavior model $g(x) = x$

b. No horizontal asymptote

41.





43. $f(x) = 1 + \sin x$ over $[0, \pi/2]$

$f(0) = 1$

$f(\pi/2) = 2$

$$\text{Avg ROC} = \frac{2-1}{\frac{\pi}{2} - 0} = \frac{2}{\pi}$$

47. $f(x) = x^2 - 3x \quad P = (1, f(1)) \rightarrow (1, -2)$

a. Slope at $x=1$

$$\lim_{h \to 0} \frac{f(1+h) - f(1)}{h}$$

$$= \lim_{h \to 0} \frac{(1+h)^2 - 3(1+h) + 2}{h}$$

$$= \lim_{h \to 0} \frac{1 + 2h + h^2 - 3 - 3h + 2}{h}$$

$$= \lim_{h \to 0} \frac{h^2 - h}{h}$$

$$= \lim_{h \to 0} \frac{h(h-1)}{h}$$

$$= -1$$

b. $y + 2 = -1(x-1)$

c. $y + 2 = 1(x-1)$ ← normal is $\perp$ to tangent

54. let $\lim_{x \to c} f(x) = A$

$$\begin{cases} A + B = 2 \\ A - B = 1 \end{cases}$$

$\lim_{x \to c}$

$\lim_{x \to c} f(x) = B$

$$\begin{cases} \\ A - B = 1 \end{cases}$$

$2A = 3$

$A = 3/2$

$B = 1/2$