GRAPH:

$$f(x) = \begin{cases} 3-x^2, & x<1 \\ 4, & x=1 \\ 4-2x, & x>1 \end{cases}$$

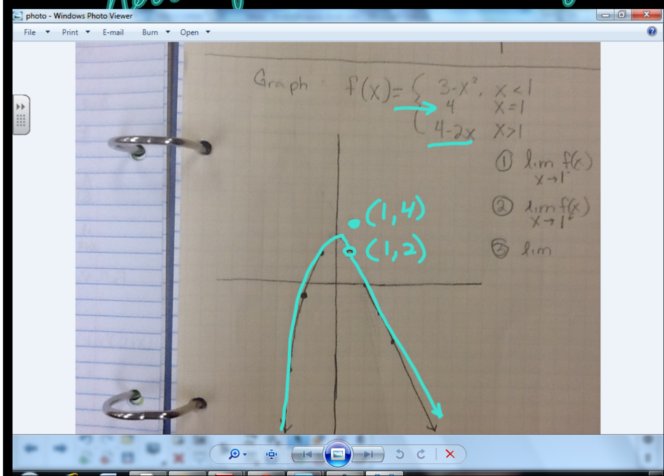
① $\lim_{x\to 1^-} f(x) = 2$

③ $\lim_{x\to 1} f(x) = 2$

② $\lim_{x\to 1^+} f(x) = 2$

④ $f(1) = 4$

⑤ Is $f(x)$ continuous @ $x=1$? Use our new definition of continuity.



$f(x)$ is not continuous @ $x=1$ bc $\lim_{x\to 1} f(x) \neq f(1)$.

Three requirements for $f(x)$ to be continuous @ $x=c$:

① $\lim_{x\to c} f(x)$ exists

② $f(c)$ exists

③ $\lim_{x\to c} f(x) = f(c)$

Test Thursday
ETEH Tuesday & Wednesday
Thursday & Friday optional (can work on error analysis or tutor others!)

Review materials posted online

*Limits (graphically & algebraically)
*Secant & tangent lines
*Average & Instantaneous rates of change
*Continuity

degnum=2
degdenom=3
$n<d$

$$\lim_{x\to\infty} \frac{4x^2-50}{x^3-85} = 0$$

$$\lim_{x\to-\infty} \frac{4x^2-50}{x^3-85} = 0$$

Ex.

$$\lim_{x\to\infty} \frac{4x^3+50}{1x^3-85} = 4$$

$n=d$

$$\lim_{x\to-\infty} \frac{4x^3+50}{1x^3-85} = 4$$

$$\lim_{x\to\infty} \frac{50+4x^3}{-85+x^3} = 4$$

Ex. $\lim_{x\to\infty} \frac{4x^4+50}{x^3-85} =$ dne

$n>d$

$$\lim_{x\to-\infty} \frac{4x^4+50}{x^3-85} = -\infty \text{ (dne)}$$

Example 7) If $s(t) = t^2 - 2t$ is a measure of feet . ..., find

a) the average velocity between $t = 0$ and $t = 2$

Slope of secant line btn t=0 and t=2

b) the instantaneous velocity at $t = 2$ seconds.

slope of the tangent line at t=2

$$\text{avg vel} = \frac{s(2)-s(0)}{2-0} \quad \frac{ft}{sec}$$

$$= \frac{2^2-2\cdot 2-(0^2-2\cdot 0)}{2}$$

$$= 0 \text{ ft/sec}$$

$$\text{DQ: } \frac{f(x+h)-f(x}{h}$$

$$\lim_{h\to 0} \frac{s(2+h)-s(2)}{h}$$

$$\lim_{h\to 0} \frac{(2+h)^2-2(2+h)-[2^2-2\cdot 2]}{h}$$

$$= \lim_{h\to 0} \frac{4+4h+h^2-4-2h-0}{h}$$

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

$$= \lim_{h\to 0} h+2 = 2 \text{ ft/sec}$$

10. If $s(t) = t^2 - 3t + 2$ is a measure of miles, find t (hours)

a) the average velocity between $t = 0$ and $t = 4$

b) the instantaneous velocity at $t = 1$ hour.

$s(t) = t^2 - 3t + 2$

avg vel

$$= \frac{s(4) - s(0)}{4 - 0}$$

$$= \frac{4^2 - 3\cdot 4 + 2 - (0^2 - 3\cdot 0 + 2)}{4}$$

$$= \frac{16 - 12 + 2 - 2}{4}$$

$= 1$ mi/hr

inst velocity @ $t = 1$

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

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

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

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

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

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

Attachments

secant-tangent relationship.gsp

Rate of Change Homework.docx