Unit 1 Progress Check A

(i)

1.) $\lim_{x\to 0}\left(f(x) - g(x)\right) = \lim_{x\to 0} f(x) - \lim_{x\to 0} g(x)$

$= 2 - 2 = 0$

(ii) $\lim_{x\to 1} f(x)$ Does not exist $\lim_{x\to 1^-} f(x) = 1$

Jump.

$\lim_{x\to 1^+} f(x) = 0$

$\lim_{x\to 2} f(x) = 1$

$\lim_{x\to 4} f(x) = -1$

$\lim_{x\to 6} f(x) \to \infty$ (or does not exist since ∞ is not real)

iii) No not continuous

$\lim_{x\to 3} f(x) = -1 \quad f(3) = 2 \quad -1 \neq 2$

iv.) approximates means we have to use 2 pts.

$$\text{IROC} \approx \frac{g(.001) - g(-.001)}{.001 - -.001} = \frac{2.001 - 1.999}{.002} = \frac{.002}{.002} = 1$$

Unit 1 Progress check A

2.) $F(x) = \dfrac{ax^2+bx+2}{2x^2-8}$

H.A $\rightarrow y=3$ since degree of num. = degree of den.

$y = 3 = \dfrac{a}{2}$ $\quad 3(2) = a = 6$ ✓

removable discontinuity (hole) implies something cancels.

$2x^2-8 = 2(x^2-4) = 2(x+2)(x-2)$

since Hole at $x=2 \rightarrow x-2$ cancels

$ax^2+bx+2 = (6x-1)(x-2)$

$2 = (-1)(-2)$
$ax^2 = (ax)(x)$

$\underline{(ax-1)(x-2)} \longrightarrow$

$(6x)(-2)+(-1)(x)$
$= -12x - 1x$
$= -13x \rightarrow b = -13$ ✓

Unit 1 Progress Check A.

2.) cont.

$$f(x) = \frac{6x^2 - 13x + 2}{2x^2 - 8} = \frac{(6x-1)(x-2)}{2(x+2)(x-2)}$$

$$= \frac{6x-1}{2(x+2)}$$

at $x = 2$ $\quad \frac{6(2)-1}{2(2+2)} = \frac{12-1}{2(4)} = \frac{11}{8}$

to make f(x) continuous

$$f(x) = \left\{ \begin{array}{ll} \frac{6x-1}{2(x+2)}, & x \neq 2 \\ \frac{11}{8}, & x = 2 \end{array} \right\}$$

there is a vertical asymptote at

$x = -2$ since $x+2 = 0$ did not cancel

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

Unit 1 Progress Check B

(i)

1.) $\lim_{t\to\infty} N(t) = \dfrac{80}{.05} = 80 \cdot 20 = 1600$

In the distant future, the # of fish in the pond should be approaching 1600.

(ii)

$\lim_{t\to 8^-} N(t) = 25(8) + 150 = 200 + 150 = 350$

$\lim_{t\to 8^+} N(t) = \dfrac{200 + 80(8)}{2 + .05(8)} = \dfrac{200+640}{2+.4} = \dfrac{840}{2.4} = 350$

$$\begin{array}{r} 350 \\ 2.4\overline{)8400} \\ \underline{72} \\ 120 \\ \underline{120} \\ 00 \end{array}$$

$N(8) = \dfrac{200 + 80(8)}{2 + .05(8)} = 350$

$\lim_{t\to 8} N(t) = N(8) = 350$. yes $N(t)$ is continuous at $t = 8$.

(iii) $f(0) = 80$ $f(6) = 25(6) + 150 = 300$

Since $N(t)$ is continuous on $[0, 8]$ there must be a value of t in $[0, 8)$ such that $N(t) = 250$ by Intermediate Value Theorem since 250 is between 80 and 300.