# Epsilon-Delta WS

1) Let $f(x) = \dfrac{4x^2 - 11x + 6}{x - 2}$.

a) Determine the domain of *f*.

b) Use a table to determine $\lim_{x \to 2} \dfrac{4x^2 - 11x + 6}{x - 2}$.

c) Given $\varepsilon = 1$, find the largest possible $\delta$ such that $0 < |x - 2| < \delta$ implies $|f(x) - 5| < \varepsilon$.
(That is, find the largest $\delta$ so that the graph "exits the corners" of the screen.)

d) Given $\varepsilon = 0.4$, find the largest possible $\delta$ such that $0 < |x - 2| < \delta$ implies $|f(x) - 5| < \varepsilon$.

e) Given $\varepsilon = 0.001$, find the largest possible $\delta$ such that $0 < |x - 2| < \delta$ implies $|f(x) - 5| < \varepsilon$.

f) Given ANY $\varepsilon$, what should be the value of $\delta$ such that $0 < |x - 2| < \delta$ implies $|f(x) - 5| < \varepsilon$?

2) Let $g(x) = \dfrac{4x^2 - 12x + 5}{2x - 5}$.

a) Determine the domain of *g*.

b) Use a table to determine $\lim_{x \to \frac{5}{2}} \left( \dfrac{4x^2 - 12x + 5}{2x - 5} \right)$. Use this limit as *L* in the following.

c) Given $\varepsilon = 1$, find the largest possible $\delta$ such that $0 < \left| x - \frac{5}{2} \right| < \delta$ implies $|f(x) - L| < \varepsilon$.

d) Given $\varepsilon = 0.4$, find the largest possible $\delta$ such that $0 < \left| x - \frac{5}{2} \right| < \delta$ implies $|f(x) - L| < \varepsilon$.

e) Given $\varepsilon = 0.001$, find the largest possible $\delta$ such that $0 < \left| x - \frac{5}{2} \right| < \delta$ implies $|f(x) - L| < \varepsilon$.

f) Given ANY $\varepsilon$, what should be the value of $\delta$ such that $0 < \left| x - \frac{5}{2} \right| < \delta$ implies $|f(x) - L| < \varepsilon$?

BONUS

3) Let $g(x) = \dfrac{2x - 5}{4x^2 - 12x + 5}$.

a) Determine the domain of *g*.

b) Use a table to determine $\lim_{x \to \frac{5}{2}} \left( \dfrac{4x^2 - 12x + 5}{2x - 5} \right)$. Use this limit as *L* in the following.

c) Given $\varepsilon = 1$, find the largest possible $\delta$ such that $0 < \left| x - \frac{5}{2} \right| < \delta$ implies $|f(x) - L| < \varepsilon$.
(NOTE: Since this graph is not "linear," you will not be able to go corner to corner. Remember from class that exiting the sides of the screen is okay, but not exiting the top. One side of your graph will want to exit the top before the other. Thus, that is the side that will ultimately determine $\delta$. You must use the same $\delta$, however, in both directions around $\frac{5}{2}$. Just get one decimal place of accuracy.)

d) Given $\varepsilon = 0.4$, find the largest possible $\delta$ such that $0 < \left| x - \frac{5}{2} \right| < \delta$ implies $|f(x) - L| < \varepsilon$.
(Just get one decimal place of accuracy.)

e) Given $\varepsilon = 0.001$, find the largest possible $\delta$ such that $0 < \left| x - \frac{5}{2} \right| < \delta$ implies $|f(x) - L| < \varepsilon$.
(Just get 3 decimal places of accuracy.)