Math 103-001 Fall 2015   Quiz #1

1. Consider the function $f(x) = \dfrac{x-1}{3x^2 + x - 2}$ *[7 marks]*

a) What is the domain of this function?

NEED $3x^2 + x - 2 \neq 0$

$\left(3x - 2\right)\left(x + 1\right) \neq 0$

DOMAIN IS ALL x EXCEPT $x = \dfrac{2}{3}$ AND $x = -1$.

b) Evaluate and simplify $f(2)$

$f(2) = \dfrac{2-1}{3 \cdot (2)^2 + 2 - 2} = \dfrac{1}{12}$

c) Evaluate and simplify the expression for $f(x - 2)$

$f(x-2) = \dfrac{(x-2) - 1}{3(x-2)^2 + (x-2) - 2}$

$= \dfrac{x - 3}{3x^2 - 12x + 12 + x - 2 - 2}$

$= \dfrac{x - 3}{3x^2 - 11x + 8}$

2. Find all x- and y-intercepts of the function $g(x) = \dfrac{x^2 - 9}{3x + 4}$ *[3 marks]*

y-INT : $g(0) = -\dfrac{9}{4}$

x-INT :   SOLVE $g(x) = 0$

$\Rightarrow x^2 - 9 = 0$

$x = 3$ AND $x = -3$

3. The cost (C, in $) of manufacturing x items is known to be a linear function. Producing 1000 items has a total cost of $7500. Producing 1500 items raises the costs to a total of $9000.

[6 marks]

a) Use the given information to find the cost function C(x).

LINEAR: $C(x) = mx + b$

FIND SLOPE $m = \dfrac{RISE}{RUN} = \dfrac{9000 - 7500}{1500 - 1000} = 3$

FIND INTERCEPT $C = 3x + b$

$7500 = 3(1000) + b \implies b = 4500$

COST FUNCTION IS $C(x) = 3x + 4500$

b) How many items could be produced with a total budget of $15,000?

LET $C = 15,000$

SOLVE

$15\,000 = 3x + 4500$

$x = 3500$

YOU COULD PRODUCE 3500 ITEMS.

4. Find the (x,y) co-ordinates at which the graph of $f(x) = x^2 + x - 1$

intersects the graph of $g(x) = 3x - 1$ *[4 marks]*

SET EQUAL AND SOLVE:

$x^2 + x - 1 = 3x - 1$

$x^2 - 2x = 0$

$x(x - 2) = 0 \implies x = 0$ AND $x = 2$

INTERSECTS ARE $(x, y) = (0, -1)$

AND $(x, y) = (2, 5)$