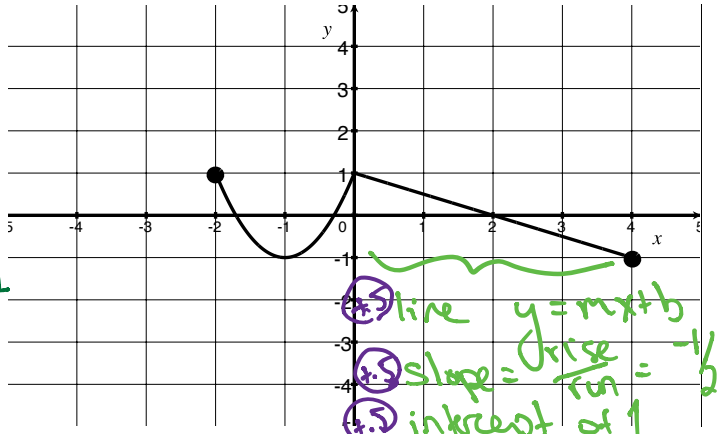
Key

TMATH 124: Quiz 2

Reasonable supporting work must be shown to earn credit.

1. [3] Find the algebraic (piece-wise defined) formula for the graph of m given below:

$$m(x) = \begin{cases} ? \; 2(x+1)^2 - 1 & \text{if } -2 \le x < 0 \\ ? \; -\frac{1}{2}x + 1 & \text{if } 0 \le x \le 4 \end{cases}$$



(+.5) quadratic $a(x-h)^2+k = y$
vertex @ $(-1,-1)$ so
(+.5) $a(x-(-1))^2-1 = y$
thru $(0,1)$ so $a(0+1)^2-1=1$
$\Rightarrow a-1=1 \Rightarrow a=2$ (+.5)
So $2(x+1)^2-1$

(+.5) line $y=mx+b$
(+.5) slope $= \frac{\text{rise}}{\text{run}} = -\frac{1}{2}$
(+.5) intercept of 1

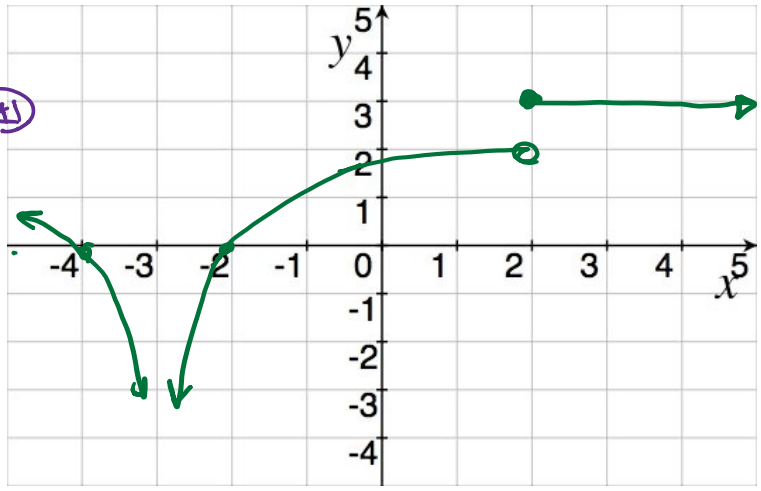
2. [4] Sketch the graph of a function β that satisfies *all* of the following.

(a) $\lim_{x\to\infty} \beta(x) = 3$ (+1)

(b) β is not continuous at $x = 2$ (+1)

(c) $\lim_{x\to -3} \beta(x) = -\infty$ (+1)

(+1)



Note there are LOTS of right answers :)

(S4.2 #92)

3. [3] Comparing the average cost of a product with the revenue the produce creates can help business owners increase profit (see TBECON220). One business found the cost, C, of making x units was well approximated by the function $C(x) = 3.25x + 5500$. Find the limit (numerically, graphically, or algebraically) of the average cost of a product as production ramps up to larger and larger numbers.

start (1.5)

(+.5) Average Cost $= \frac{\text{Total Cost}}{\#\text{ of units made}} = \frac{3.25x+5500}{x}$ (+.5)

(+.5) $\lim_{x\to\infty} \frac{3.25x+5500}{x} = ?$

technique (+.5)

algebraically:

$\lim_{x\to\infty} \frac{3.25x}{x} + \frac{5500}{x}$

get it (+.5)

$= \lim_{x\to\infty} 3.25 + \lim_{x\to\infty} \frac{5500}{x}$ ($\frac{5500}{x} \to 0$) $= 3.25$

OR numerically:

x	10	1000	100000
y	553.25	8.75	3.305

looks like getting close to 3.3