

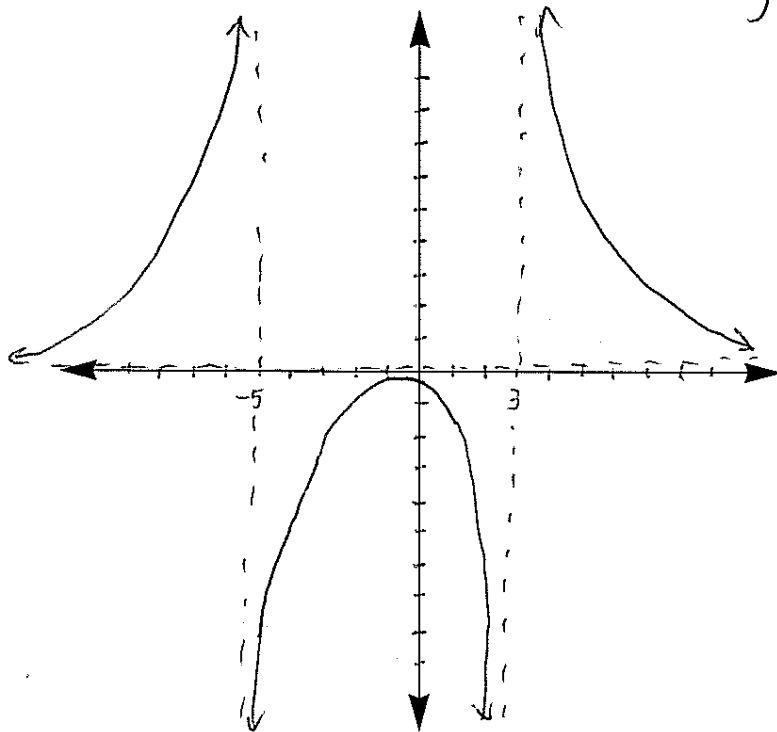
Quiz 1A - Math 130

Name: Key

1. (3 points) Simplify the difference quotient $\frac{f(x+h) - f(x)}{h}$ if $f(x) = -2x^2 + 3$.

$$\begin{aligned} \frac{f(x+h) - f(x)}{h} &= \frac{-2(x+h)^2 + 3 - (-2x^2 + 3)}{h} \\ &= \frac{-2(x^2 + 2xh + h^2) + 3 + 2x^2 - 3}{h} \\ &= \frac{-2x^2 - 4xh - 2h^2 + 2x^2}{h} \\ &= \frac{h(-4x - 2h)}{h} = \boxed{-4x - 2h} \end{aligned}$$

2. (2 points) Sketch the graph of $g(x) = \frac{4}{x^2 + 2x - 15}$. Label all horizontal and vertical asymptotes.



$$g(x) = \frac{4}{(x+5)(x-3)}$$

$\Rightarrow x = -5$ and $x = 3$ are vertical asymptotes

- degree of denominator is larger than numerator $\Rightarrow y = 0$ is a horizontal asymptote

as $x \rightarrow (-5)^-$, $f(x) \rightarrow \infty$

as $x \rightarrow (-5)^+$, $f(x) \rightarrow -\infty$

as $x \rightarrow (3)^-$, $f(x) \rightarrow -\infty$

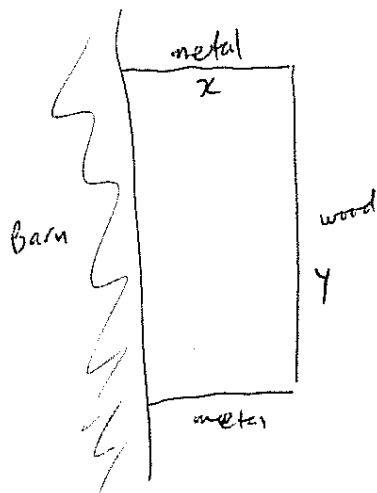
as $x \rightarrow (3)^+$, $f(x) \rightarrow \infty$

$$g(0) = \frac{4}{-15}$$

3. (2 points) A farmer wants to build a rectangular shed against one side of his barn. The two sides perpendicular to the barn will be made of metal (at a cost of \$8 per linear foot) and the side parallel to the barn will be made of wood (at a cost of \$3 per linear foot). If the farmer wants the shed to have an area of 100 square feet, write a formula that represents the cost of building the shed in terms of x , where x is the length of the side made with metal.

x = length of metal side

y = length of wood side



$$\text{Cost} = 8 \cdot (2x) + 3 \cdot y$$

$$\text{Area} = xy$$

$$100 = xy$$

$$\frac{100}{x} = y$$

$$\Rightarrow \text{Cost} = C(x) = 16x + 3\left(\frac{100}{x}\right)$$

$$C(x) = 16x + \frac{300}{x}$$

4. (3 points) Sketch the graph of $f(x) = \begin{cases} x+2 & \text{if } x < -2 \\ 3 & \text{if } -2 \leq x < 0 \\ x^2 - 1 & \text{if } x \geq 0 \end{cases}$

