Final Exam Review

Wednesday, May 1, 2019 1:05 PM

#1

$$\boxed{\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1}}$$

$$\left(\overset{x_1}{-\frac{1}{3}}, \overset{y_1}{\frac{4}{3}}\right); \left(\overset{x_2}{\frac{1}{3}}, \overset{y_2}{\frac{7}{3}}\right)$$

Slope

$$\text{Slope} = \frac{\frac{7}{3} - \frac{4}{3}}{\frac{1}{3} - \left(-\frac{1}{3}\right)} = \frac{1}{\frac{2}{3}} = 1 \cdot \frac{3}{2} = \boxed{\frac{3}{2}}$$

Point - Slope Formula:

$$\boxed{y - y_1 = m(x - x_1)}$$

slope

$$y - \frac{4}{3} = \frac{3}{2}\left(x - \left(-\frac{1}{3}\right)\right)$$

→ Simplify and get y by itself

$$y - \frac{4}{3} = \frac{3}{2}\left(x + \frac{1}{3}\right)$$

$$y - \frac{4}{3} = \frac{3}{2}x + \frac{1}{2}$$

$$y = \frac{3}{2}x + \frac{1}{2} + \frac{4}{3}$$

$$\boxed{y = \frac{3}{2}x + \frac{11}{6}}$$

#2 $f(x) = 3x^2 - 4x + 2$. Find $f(\boxed{x-1})$

$$f(x-1) = 3(x-1)^2 - 4(x-1) + 2$$

$$= 3(x-1)^2 - 4(x-1) + 2$$

$$= 3(x^2 - 2x + 1) - 4x + 4 + 2$$

$$= 3x^2 - 6x + 3 - 4x + 6$$

$$= \boxed{3x^2 - 10x + 9}$$

#3 $x^3 + 2x^2 - x - 2 > 0$

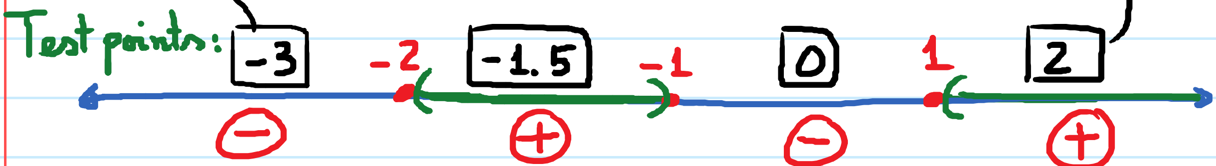
$$x^2(x+2) - (x+2) > 0$$

$$(x+2)(x^2 - 1) > 0$$

$$\boxed{(x+2)(x+1)(x-1)}\ \boxed{> 0}$$

want: $\oplus$
end points not included

Special numbers: $-2, -1, 1$



Solution: $\boxed{(-2,-1) \cup (1, \infty)}$

#4 $f(x) = \dfrac{x^2+4x-12}{x^2-3x-10}$. Domain?

$\boxed{\begin{array}{l}\text{Domain of } f(x) = \dfrac{p(x)}{q(x)}: \\ \quad \underline{\text{Step 1}}: \text{ Set denominator } q(x)=0 \text{ and solve for } x. \\ \quad \underline{\text{Step 2}}: \text{ All real numbers except for the } x\text{-values in Step 1.}\end{array}}$

Set: $x^2 - 3x - 10 = 0$

$(x-5)(x+2) = 0$

$\rightarrow x = 5$; $x = -2$.

<u>Domain</u>: $\boxed{\{x \mid x \neq 5 \text{ or } x \neq -2\}}$

or in interval notation: $\boxed{(-\infty,-2) \cup (-2,5) \cup (5,\infty)}$

#5 $f(x) = \dfrac{4}{x-6}$; $g(x) = \dfrac{4}{3x}$.

Find $(f \circ g)(x)$

$\boxed{(f \circ g)(x) = f(g(x))}$

1

$$f = \frac{4}{\left(\frac{4}{3x}\right) - 6} = \frac{4}{\frac{4}{3x} - \frac{6 \cdot 3x}{1 \cdot 3x}}$$

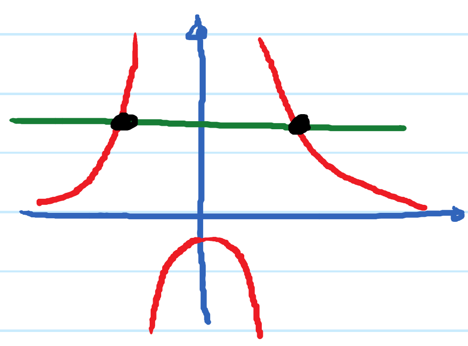
$$= \frac{4}{\frac{4}{3x} - \frac{18x}{3x}} = \frac{4}{\boxed{\frac{4 - 18x}{3x}}}$$

$$= \frac{4}{1} \cdot \frac{3x}{4 - 18x} = \boxed{\frac{12x}{4 - 18x}}$$

this could be simplified more

$$= \frac{\overset{6}{\cancel{12}}x}{\cancel{2}(2 - 9x)} = \frac{6x}{2 - 9x}$$

(6) Horizontal line test: if a horizontal line intersects the graph more than once, the function is NOT one-to-one.



NOT one-to-one.

#7 Find formula for f^{-1}.

Step 1: Replace the notation $f(x)$ by y

Multiply both sides by $x+9$

$$y = \frac{5}{x+9}$$

Step 2: Get x by itself

$$y(x+9) = 5$$

$$yx + 9y = 5 \quad \text{(Distribute)}$$

$$yx = 5 - 9y$$

$$x = \frac{5-9y}{y} \quad \text{(Get } x \text{ by itself)}$$

Step 3: Switch x and y

$$y = \frac{5-9x}{x}$$

Step 4: Replace y by the notation $f^{-1}(x)$

$$\boxed{f^{-1}(x) = \frac{5-9x}{x} = \frac{-9x+5}{x}}$$

#8 $e^{\boxed{-t}} = \boxed{216}$ → Convert to Log Form

exp

#

base

→ $\log_e(216) = -t$

→ $\boxed{\ln(216) = -t}$ (Log Form)

#9 $\log_{\boxed{b}} \boxed{81} = \boxed{4}$ → Convert to Exp Form

#

exp

base

→ $\boxed{b^4 = 81}$ (Exp Form)

#10 $\log_a 2 = 0.3010$; $\log_a 3 = 0.4771$ (Given)

Find $\log_a \frac{9}{8}$

Quotient Rule: $\log_a\left(\frac{M}{N}\right) = \log_a M - \log_a N$

$$\log_a \frac{9}{8} = \log_a 9 - \log_a 8$$

Power Rule

$$= \log_a 3^{\boxed{2}} - \log_a 2^{\boxed{3}}$$

$$= 2 \cdot \boxed{\log_a 3} - 3 \cdot \boxed{\log_a 2}$$

$$= 2 \cdot (0.4771) - 3 \cdot (0.3010)$$

$$= \boxed{0.0512}$$

$= \boxed{0.0512}$