Math 1200 Fall 2016 Exam 4A Name ~~[illegible]~~ Solutions

Show all your work to get full/partial credits. Each question is worth 5 points.

1) Divide $3x^3 + 25\,x^2 + 42x - 40 \div (x + 5)$

$$\begin{array}{r|rrrr} -5 & 3 & 25 & 42 & -40 \\ & & -15 & -50 & 40 \\ \hline & 3 & 10 & -8 & \boxed{0} \end{array} \Rightarrow \boxed{3x^2 + 10x - 8}$$

2) Factor $f(x) = 3x^3 + 25\,x^2 + 42x - 40$, given that -5 is a zero of $f(x)$.

by #1 : $3x^3 + 25x^2 + 42x - 40 = (3x^2 + 10x - 8)(x + 5)$

$= \boxed{(3x - 2)(x + 4)(x + 5)}$

3) Refer to # 2 and solve the equation $3x^3 + 25\,x^2 + 42x - 40 = 0$

we have by #2 : $(3x - 2)(x + 4)(x + 5) = 0$

$\Rightarrow \boxed{x = \frac{2}{3}, \quad x = -4, \quad x = -5}$

4) Given $f(x) = (2x^4 - 5x^3 - 5x^2 - 4x + 29)$, use the remainder theorem to find $f(3)$.

$$\begin{array}{r|rrrrr} 3 & 2 & -5 & -5 & -4 & 29 \\ & & 6 & 3 & -6 & -30 \\ \hline & 2 & 1 & -2 & -10 & \boxed{-1} \end{array} \Rightarrow \boxed{f(3) = -1}$$

5) Write a polynomial function of degree three with zeros at 1, -1, 5

$\Rightarrow f(x) = (x-1)(x+1)(x-5)$

$= (x^2-1)(x-5)$

$= \boxed{x^3 - 5x^2 - x + 5}$

For #s 6 - 9, $f(x) = \frac{4x}{x^2-4}$

6) Determine x-intercept(s)

$\Rightarrow 0 = 4x$

$x = 0$

$\Rightarrow \boxed{(0, 0)}$

7) Determine y-intercept(s)

$f(0) = \frac{4(0)}{(0)^2-4} = 0$

$\Rightarrow \boxed{(0, 0)}$

8) Identify any vertical asymptotes

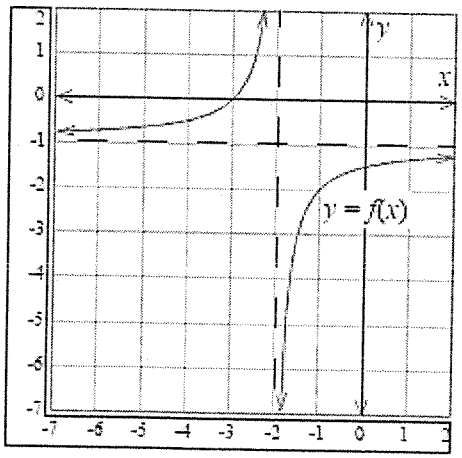
$x^2 - 4 = 0$

$\Rightarrow \boxed{x = \pm 2}$ 4

9) Identify any horizontal or slant asymptotes

$\frac{a_n x^n}{b_m x^m} = \frac{4x}{x^2} \Rightarrow \boxed{y = 0 \text{ is H.A \& no slants}}$

10) For the graph, state the behavior as:



a) As $x \longrightarrow -\infty$, $f(x) \longrightarrow -1$

b) As $x \longrightarrow -2^-$, $f(x) \longrightarrow \infty$

c) As $x \longrightarrow -2^+$, $f(x) \longrightarrow -\infty$

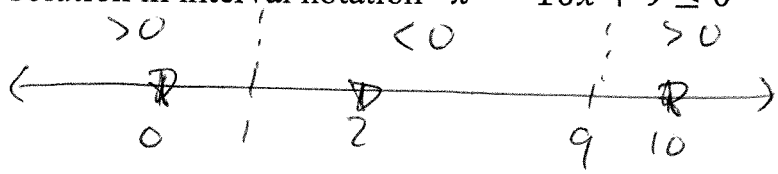
d) As $x \longrightarrow \infty$, $f(x) \longrightarrow -1$

11) Solve inequality and write solution in interval notation $x^2 - 10x + 9 \leq 0$

$x^2 - 10x + 9 = 0$

$(x-9)(x-1) = 0$

$\Rightarrow x = 9,\ x = 1$



$p(0) = (-9)(-1) = 9 > 0$

$p(2) = (2-9)(2-1) = (-7) < 0$

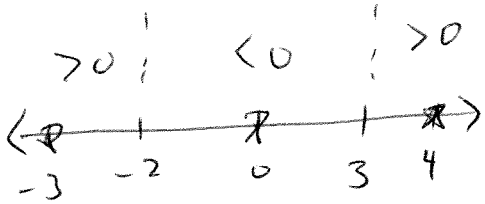
$p(10) = (10-9)(10-1) = (9) > 0$

$\Rightarrow \boxed{[1, 9]}$

12) Solve inequality and write solution in interval notation $\frac{x+2}{x-3} > 0$

$x + 2 = 0 \Rightarrow x = -2$

$x - 3 = 0 \Rightarrow x = 3$



$r(-3) = \frac{-3+2}{-3-3} = \frac{-1}{-6} > 0$

$r(0) = \frac{2}{-3} < 0$

$r(4) = \frac{4+2}{4-3} = \frac{6}{1} > 0$

$\Rightarrow \boxed{(-\infty, -2) \cup (3, \infty)}$

Refer to the following for #s 13-16.

The number of people that a ham can serve varies directly as the weight of the ham. An 8 lb. ham feeds 20 people.

13) Write an equation expressing the statement in terms of P, number of people, k, a constant, and w, the weight of the ham.

$P = kw$

14) Find k.

$20 = k(8) \Rightarrow k = \frac{20}{8} = \boxed{\frac{5}{2}}$

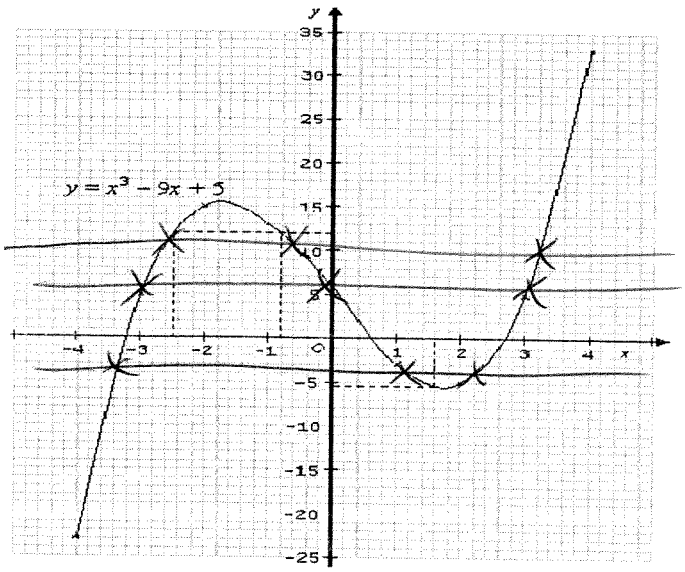
15) How many people will a 10 lb ham serve?

$P = \frac{5}{2}(10) = \boxed{25}$

16) If a ham serves 30 people, how much did it weigh?

$30 = \frac{5}{2}w \Rightarrow w = \frac{2}{5} \cdot 30 = \boxed{12}$

17) Is the following graph one-to-one? Explain.



NO, does not pass HLT.

18) Using the definition of a one-to-one function determine whether $f(x) = x^2 + 5$ is one-to-one.

$f(a) = a^2 + 5 = b^2 + 5 = f(b)$

$\Rightarrow a^2 = b^2$

$\Rightarrow a = \pm b \not\Rightarrow a = b$, so not one-to-one.

19) Determine if the following functions are inverse of each other.

$f(x) = 7x - 3$ and $g(x) = \frac{x+3}{7}$

$f(g(x)) = f\left(\frac{x+3}{7}\right) = 7\left(\frac{x+3}{7}\right) - 3 = x + 3 - 3 = x$ ✓

$g(f(x)) = g(7x-3) = \frac{(7x-3)+3}{7} = \frac{7x}{7} = x$ ✓ $\Rightarrow$ $\boxed{\text{yes, inverses}}$

20) Given $h(x) = \frac{4-x}{9}$, find $h^{-1}(x)$.

$y = \frac{4-x}{9}$

$x = \frac{4-y}{9}$

$9x = 4 - y$

$y = 4 - 9x$

$\boxed{h^{-1}(x) = 4 - 9x}$