Math 1200 Exam 4A (Fall 2014) Name: _____

Show all your work in order to get full credit. Each question is worth 5 points.

If $f(x) = x^4 + 6x^3 - 12x^2 - 30x + 35$, use the remainder theorem to check if

1. $(x + 7)$ is a factor of $f(x)$.

$-7)\ 1\ \ 6\ \ -12\ \ -30\ \ 35$

$\quad\ \ -7\ \ 7\ \ 35\ \ -35$

$1\ \ -1\ \ -5\ \ 5\ \ \boxed{0}$

$\boxed{R=0.\text{ so it is a factor}}$

2. (-7) a zero of $f(x)$.

$f(-7) = \text{Remainder} = 0$

$\Rightarrow f(-7) = 0$

$\Rightarrow -7$ is a zero of $f(x)$

For $f(x) = \frac{x+7}{2x^2-x-10}$ find,

3. Vertical asymptote(s)

$f(x) = \frac{x+7}{2x^2-x-10} = \frac{x+7}{(x+2)(2x-5)}$

Vertical asym. are $\boxed{x = -2 \text{ and } x = \frac{5}{2}}$

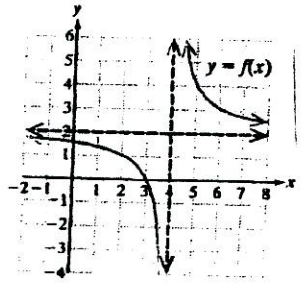
4. Horizontal asymptote(s)

$n = 1$

$m = 2$, $n < m$

So $\boxed{y = 0}$ is the hor. asymp.

Refer to the graph and complete the following statements.



5. As $x \to -\infty$, $f(x) \to$ ...2.....

6. As $x \to 4^+$, $f(x) \to$ ...∞....

7. $f(x)$ is increasing over the interval(s)....{ }....

8. The domain is..$\mathbb{R} - \{4\}$...

9. The range is..$\mathbb{R} - \{2\}$...

10. Solve $4x^2 - 12x + 9 < 0$

$4x^2 - 12x + 9 < 0$

$\Leftrightarrow (2x-3)^2 < 0$

Since the LHS is always ≥ 0 so it has $\boxed{\text{no solution}}$.

11. Solve $\frac{x+2}{x-3} \leq 0$.

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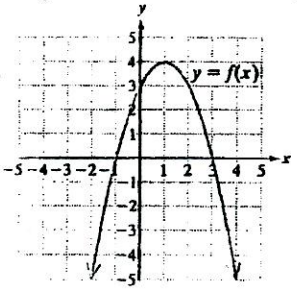
Boundary points are $x = -2$, $x = 3$

Intervals	$(-\infty, -2)$	$(-2, 3)$	$(3, \infty)$
Test point	-3	0	4
sign of $x+2$	$-$	$+$	$+$
sign of $x-3$	$-$	$-$	$+$
sign of $\frac{x+2}{x-3}$	$+$	$-$	$+$

✓

Solution set is: $[-2, 3)$

For the graph of $y = f(x)$. Solve the inequalities.



12. $f(x) < 0$...$(-\infty, -1) \cup (3, \infty)$

13. $f(x) \leq 0$..$(-\infty, -1] \cup [3, \infty)$

14. $f(x) > 0$...$(-1, 3)$

15. $f(x) \geq 0$...$[-1, 3]$

16. Find the constant of variation k. Y is inversely proportional to X. When Y is 18, X is 54.

$y = \frac{K}{x}$, $y = 18$, $x = 54$

$18 = \frac{K}{54}$ $\Rightarrow K = 18 \times 54 = 972$

The amount of simple interest earned in an account varies jointly as the interest rate and time of the investment. An account earns $200 in 2 years at 4% interest.

17. Write an equation relating interest, principal, and time.

$I = Prt$

18. Find the interest in 3 years at a rate of 5%.

$I = \$200$, $t = 2$ yrs, $r = 0.04$ $\quad I = Prt \Rightarrow 200 = P \times 0.04 \times 2 \Rightarrow P = \frac{100}{0.04} = \frac{100 \times 100}{4} = 2500$

$I = ?$ $t = 3$ yrs, $r = 0.05$ $\quad$ Now, $I = 2500 \times r \times t = 2500 \times 0.05 \times 3 = \$375$

19. Using the definition of one-to-one function determine if $f(x) = |x + 1|$ is a one-to-one function.

Let $f(a) = f(b)$

$\Rightarrow |a+1| = |b+1|$

$\not\Rightarrow a = b$

So f is not one to one

20. The cost for a speeding ticket is $100 plus $12 for each mile per hour over the speed limit. The cost of the ticket f(x) (in $) is given by $f(x) = 100 + 12x$, where x is the number of miles per hour over the posted speed limit. Find the inverse of f(x).

$f(x) = 12x + 100$

$y = 12x + 100$

$x \leftrightarrow y$

$x = 12y + 100 \Rightarrow y = \frac{x - 100}{12}$ i.e. $f^{-1}(x) = \frac{x-100}{12}$