MAC 1105 Sample Test 4 - KEY

1) False

2) True

3) True

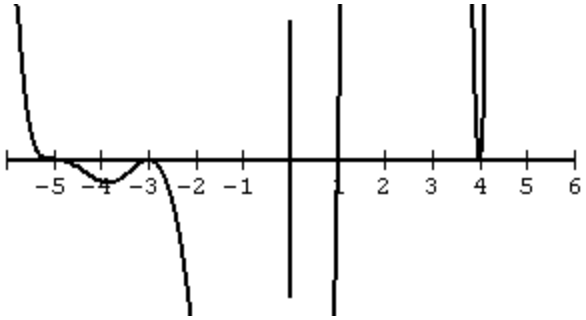
4) False

5) False

6) $\pm 1, \frac{1}{2}, \frac{1}{3}, \frac{1}{6}, 2, \frac{2}{3}, 5, \frac{5}{2}, \frac{5}{3}, \frac{5}{6}, 10, \frac{10}{3}$

7) $x^4 - 5x^3 - 10x^2 + 10x + 20 + \frac{35}{x-2}$

8) See the graph to the right $\rightarrow$
(Graph is NOT unique)



9) $f(x) = -(x+4)(x+2)(x-1)$

10) $f(x) = x^2(x-2)^3$

11) $f(x) = -(x+5)^2(x+2)(x-1)^3$

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

13) $f(x) = -2(x+1)^2 + 3$; increasing on $(-\infty, -1)$ and decreasing on $(-1, \infty)$

14)

zeros:	$x = 0$,	$x = 2$,	$x = -\frac{1}{3}$,	$x = -1$
multiplicity:	2	3	1	2

15) $f(x) = (x-2)(x+1)(x-3) = x^3 - 4x^2 + x + 6$

16) $f(x) = (x-3)(x-1)(x+2)$

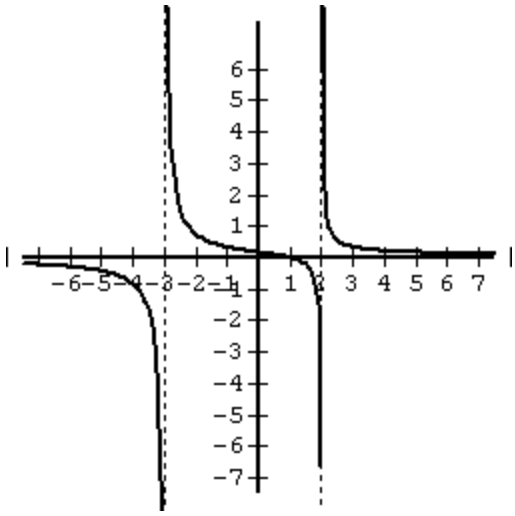
17) $f(x) = (x+2)^2(x+1)(x-1)^3$

18) $f(x) = 8\left(x+2\right)\left(x-\frac{1}{2}\right)\left(x-\frac{7}{4}\right) = \left(x+2\right)\left(2x-1\right)\left(4x-7\right)$

19) $x = -5$ or $x = -\sqrt{7}$ or $x = 1$ or $x = \sqrt{7}$
$f(x) = (x+5)\left(x+\sqrt{7}\right)(x-1)\left(x-\sqrt{7}\right)$

A) Sketch the **graphs** of the following functions. (Be sure to show all asymptotes with dotted lines)
B) State the **equations** of all asymptotes.

20) $f(x) = \dfrac{x-1}{x^2+x-6}$



Equations of Asymptotes:
Vertical Asymptote(s):
$x = -3,\ x = 2$
Horizontal Asymptote:
$y = 0$

Where is (x-values):
$f(x) \geq 0$
$(-3,1] \cup (2,\infty)$
$f(x) \leq 0$
$(-\infty,-3) \cup [1,2)$

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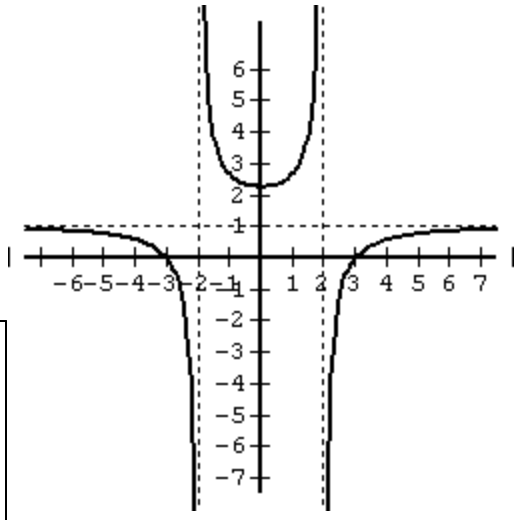
21) $f(x) = \dfrac{x^2-9}{x^2-4}$

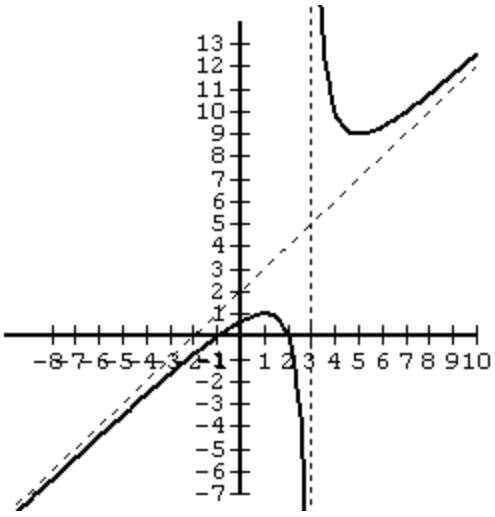


Equations of Asymptotes:
Vertical Asymptote(s):
$x = -2,\ x = 2$
Horizontal Asymptote:
$y = 1$

Where is (x-values):
$f(x) \geq 0$
$(-\infty,-3] \cup (-2,2) \cup [3,\infty)$
$f(x) \leq 0$
$[-3,-2) \cup (2,3]$

BONUS PROBLEM

Graph: $f(x) = \dfrac{x^2-x-2}{x-3}$



Equations of Asymptotes:
Vertical Asymptote(s):
$x = 3$
Slant Asymptote:
$y = x + 2$