MATHEMATICS DEPARTMENT

Houston Community College - Central Campus

MATH 1314 FINAL REVIEW PROBLEMS

Revised 04-27-12

These exercises represent a compilation of typical problems in this course. This is NOT a sample of the final exam. However, doing these problems will help you to prepare for the final exam.

Solve the following equations:

1) $(6t+4)^2=3$

2) $2x^2+10x=-1$

3) $3x^2 - 2x + 4 = 0$

Solve the equations.

4) $p^4-3p^2-18=0$

5) $(t-5)^{2/3}-6(t-5)^{1/3}+5=0$

6) $3+\sqrt{x+3} = x$

7) $\sqrt{x+8} - \sqrt{x-4} = 2$

Solve the inequality.

8) $x^2+5x\geq-6$

9) $\frac{x+28}{x-4} < 4$

10) $|3 + 3x| > 2$

11) $\left|\frac{2x-9}{3}\right| \leq 5$

12) **Find the center and radius of the circle.**

$x^2 + y^2 - 12x + 10y + 61 = 64$

13) **Find the equation of the circle that has:**

A) center at (0,-5) and radius of $\sqrt{15}$

B) center at (-2,3) and passes through (-2,9)

Find the function value.

14) Find f(x+1) when $f(x) = 7x^2 - 3$.

Find the domain.

15) $f(x) = \sqrt{4 + x}$

16) $f(x) = \frac{2x-1}{4-x^2}$

Find the slope and y-intercept. Then graph the equation.

17) x-5y-5=0

Write the equation of the line in standard form

18) x-intercept-5, y-intercept 3

Write the equation of the line in slope-intercept form.

19) Through (-2,-1) and perpendicular to $9x - 7y = 11$.

Evaluate the function at the given value of the independent variable.

20) $F(x) = \begin{cases} 3x, & if\ x \leq -1 \\ x - 5, & if\ x > -1 \end{cases}$

Find f(-7)

Find the value.

21) f(x)= x-6, g(x)= $-5x^2+11x+3$. Find (fg)(3)

Find the composite function and give its domain.

22) $(f \circ g)(x)$: $f(x) = 2x^2 - 3x + 4$, $g(x) = 2x + 1$

Give the vertex, axis of symmetry, domain, range, relative maximum or minimum, and the intercepts.

23) $f(x) = -x^2 - 4x + 5$

Find all rational zeros and their multiplicities. Factor the polynomial into linear factors.

24) $f(x) = x^3 + x^2 - 8x - 12$

Give the equations of the vertical and horizontal or oblique (slant) asymptotes.

25) $f(x) = \frac{x-1}{x^2-9}$

26) $f(x) = \frac{3x^2-7}{3x^2+4}$

27) $f(x) = \frac{x^2-6x+2}{x+6}$

Find the equation of the inverse, if a one -to-one function.

28) $f(x) = x^3 + 1$

Graph the function.

29) $f(x) = 2^{-x}$

Solve the equation.

30) $\left(\frac{1}{5}\right)^{x-2} = (125)^{x+1}$

Find the value of the expression.

31) $\log_a \frac{1}{\sqrt{a}}$

32) $e^{3 \ln 4}$

33) $\log \frac{1}{10000}$

Convert to logarithmic form.

34) $7^{-3} = \frac{1}{343}$

Convert to exponential form.

35) $\log_b c = a$

Find the domain of the logarithmic function.

36) $f(x) = \log 7\ (x + 5)$

Expand the expression using the properties of logarithms. Assume that all variables represent positive real numbers.

37) $\log_7 \frac{\sqrt[6]{19}}{n^2 m}$

Write the expression as a single logarithm whose coefficient is 1.

38) $3 \ln x - \frac{1}{3} \ln 8$

Solve the equation.

39) $3e^{9x+5} = 6$

40) $\log_5 x + \log_5(4x - 1) = 1$

Solve the system.

41) $x + 8y = 32$
$-3x + 9y = 36$

42) $8x - 6y = 1$
$-16x + 12y = 1$

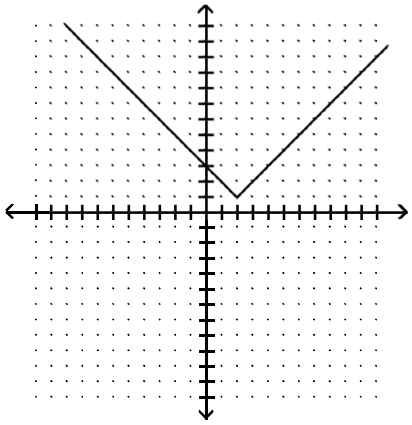
Find the determinant of the matrix.

43) $\begin{bmatrix} -6 & -8 \\ b & a \end{bmatrix}$

44) **Find the indicated matrix.**

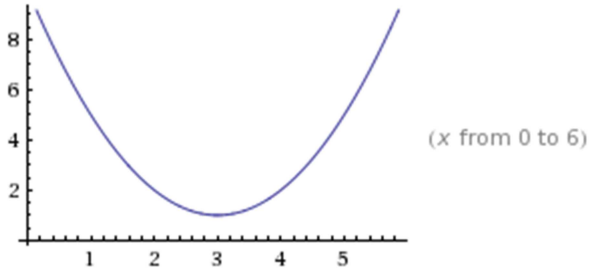
Let $C = \begin{bmatrix} 1 \\ -3 \\ 2 \end{bmatrix}$ and $D = \begin{bmatrix} -1 \\ 3 \\ 2 \end{bmatrix}$. $Find\ 2C - 3D$

Use the given graph to answer the questions



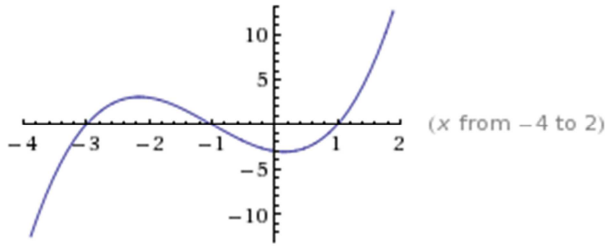
45) a) Does the graph represent a function?
b) Does the graph represent a one-to-one function?
c) Where is the relation increasing? Where is it decreasing?
d) Give the correct equation for the graph?
e) Determine the domain and range of the relation.

46) **Select the equation that describes the graph shown.**



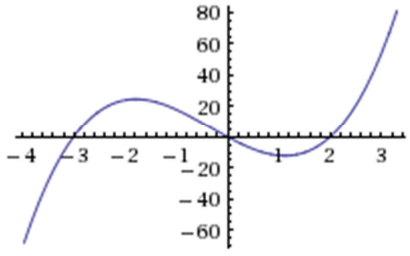
A) $f(x) = (x+3)^2 + 1$ B) $f(x) = (x-1)^2 + 3$ C) $f(x) = (x-3)^2 + 1$ D) $f(x) = (x-3)^2 - 1$

47. **How many real zeroes does this graph have?**

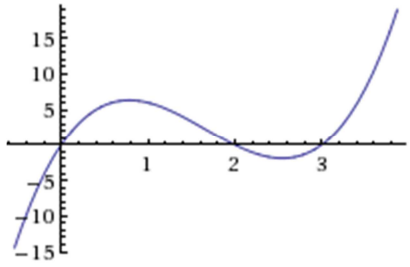


a) 1 B) 2 C) 0 D)3

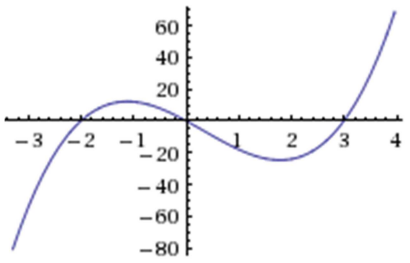
48) **Graph the polynomial function** $f(x) = 3x(x-3)(x+2)$

a) 

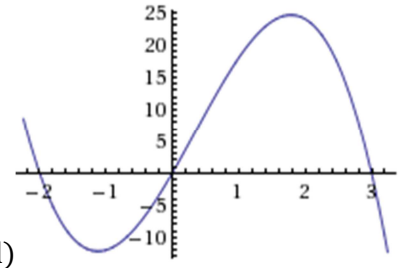
(x from -4 to 3)

b) 

(x from 0 to 4)

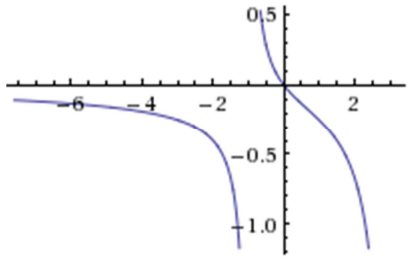
c) 

(x from -3 to 4)

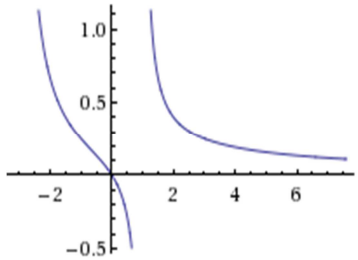
d) 

(x from -2 to 3)

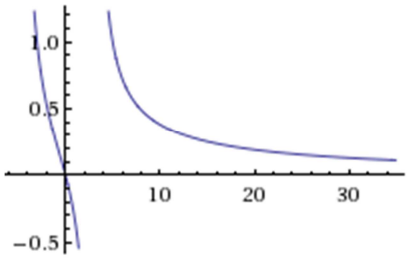
49) **Sketch the graph of the rational function** $\frac{x}{(x-3)(x+1)}$

a) 

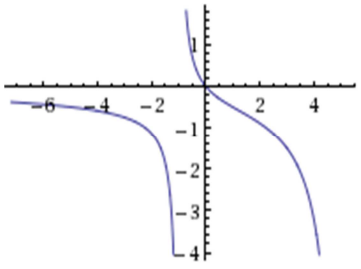
(x from -6 to 2)

b) 

(x from -2 to 6)

c) 

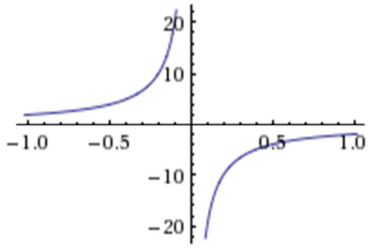
(x from 0 to 30)

d) 

(x from -6 to 4)

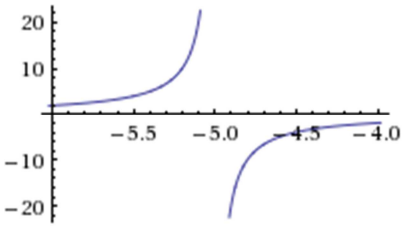
50. **Graph the function $f(x) = \frac{5}{x}$.**

a)



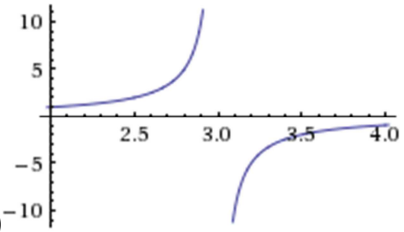
(x from −1 to 1)

b)



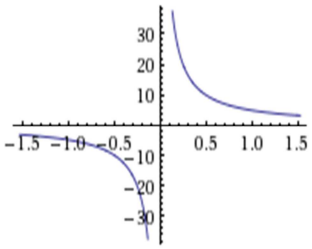
(x from −6 to −4)

c)



(x from 2 to 4)

d)



(x from −1.5 to 1.5)

51) **Find the determinant of the matrix.**

$$\begin{pmatrix} 2 & 0 & 0 \\ 1 & -3 & 0 \\ -3 & 9 & 9 \end{pmatrix}$$

52) **The base and height of a triangle must have a sum of 40 inches. Find the base and height of the triangle whose area is as large as possible.**

53) **Find the dimensions of a rectangular garden with perimeter 62 yards and area 220 square yards (yd^2).**

54) **Find the product AB, if possible.**

$A=\begin{bmatrix} -2 & 3 \\ 3 & 2 \end{bmatrix}$, $B=\begin{bmatrix} 3 & 0 \\ -1 & 4 \end{bmatrix}$

55) **If x=- 4 is a solution of the equation of $x^3 + 4x^2 + x + 4$, find the remaining solutions.**

56) **Find all real zeroes of the function $f(x) = (x - 5)(x + 7)(x - 1)^2$ and determine the multiplicity of each.**

57) **Determine whether 1 is an upper bound of the real zeroes of the function $f(x) = 4x^3 - 3x^2 + 4x - 3$.**

58) **List all possible rational zeroes given by the Rational Zeroes Theorem. Do not check to see which actually are zeroes.**

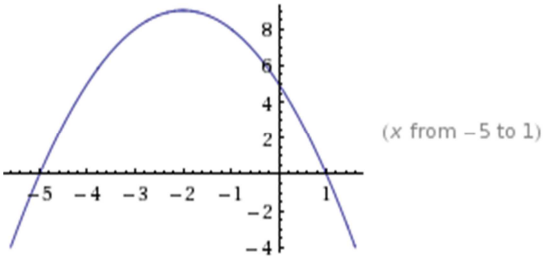
$$P(x) = 2x^4 - 4x^3 + x^2 - x - 15$$

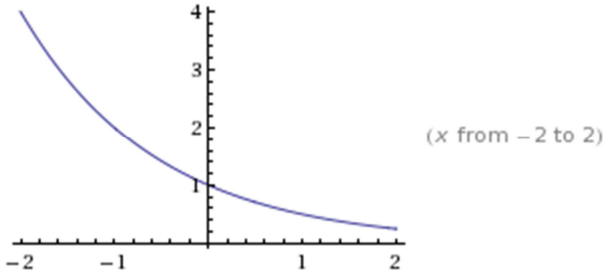
59) **Use Descartes's Rule of Signs to determine the possible number of positive and negative zeroes of the function $f(x) = 2x^3 - 5x^2 - 14x + 8$.**

60) **Determine whether the function is even, odd, or neither. Describe the type of symmetry that the graph possesses.**

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

1. $\left\{\frac{-4\pm\sqrt{3}}{6}\right\}$
2. $\left\{\frac{-5\pm\sqrt{23}}{2}\right\}$
3. $\left\{\frac{1}{3}\pm\frac{\sqrt{11}}{3}i\right\}$
4. $\{\pm 6, \pm i\sqrt{3}\}$
5. $\{130, 6\}$
6. $\{6\}$
7. $\{8\}$
8. $(-\infty, -3]\ 1\ [-2, \infty)$
9. $\left(\frac{44}{3}, \infty\right)$
10. $\left(-\infty, -\frac{5}{3}\right) \cup \left(-\frac{1}{3}, \infty\right)$
11. $[-3, 12]$
12. $(x-6)^2 + (y+5)^2 = 64$
13. A. $x^2 + (y+5)^2 = 15$
    B. $(x+2)^2 + (y-3)^2 = 36$
14. $7x^2 + 14x + 4$
15. $[-4, Q)$
16. $(-Q, -2)$ or $(-2, 2)$ or $(2, Q)$
17. Slope $\frac{1}{5}$; y-intercept $(0, -1)$
18. $3x - 5y = -15$
19. $y = -\frac{7}{9}x - \frac{23}{9}$
20. -21
21. 27
22. $(f \circ g)(x) = 8x^2 + 2x + 3$; Domain: $(-Q, Q)$
23. Vertex $(-2, 9)$; Axis of symmetry $x = -2$;
    Domain $= (-Q, Q)$; Range $= (-Q, 9]$
    Relative maximum $= 9$; x-intercepts $(-5, 0)$ and $(1, 0)$; y-intercept $(0, 5)$



24. -2 (multiplicity 2), 3 (multiplicity 1);
    $f(x) = (x+2)^2(x-3)$
25. Vertical Asymptote: $x = 3, x = -3$
    Horizontal Asymptote: $y = 0$
26. Vertical Asymptote: none
    Horizontal Asymptote: $y = 1$
27. Vertical Asymptote: $x = -6$
    Oblique (slant) Asymptote: $y = x - 12$
28. $f^{-1}(x) = \sqrt[3]{x-1}$
29. 

30. $\left\{-\frac{1}{4}\right\}$
31. $-\frac{1}{2}$
32. 64
33. – 4
34. $\log_7 \frac{1}{343} = -3$
35. $b^a = c$
36. $(-5, \infty)$
37. $\frac{1}{6}\log_7 19 - 2\log_7 n - \log_7 m$
38. $\ln \frac{x^3}{2}$
39. $\frac{1}{9}(\ln 2 - 5)$
40. 5
41. {(0,4)}
42. ∅
43. - 6a + 8b
44. $\begin{bmatrix} 5 \\ -15 \\ -2 \end{bmatrix}$
45. a) yes
    b) yes

c) $increasing\ (2,\infty)\ \ decreasing\ (-\infty,2)$

d) $f(x) = |x-2|+1$

e) $domain\ (-\infty,\infty)\ \ range\ [1,\infty)$

46. C
47. D
48. C
49. A
50. D
51. -54
52. base 20 inches; height 20 inches
53. 20 yd by 11 yd
54. $\begin{bmatrix} -9 & 12 \\ 7 & 8 \end{bmatrix}$
55. $\pm i$
56. 5(multiplicity 1), -7 (multiplicity 1), 1(multiplicity 2)
57. yes
58. $\left\{\pm\frac{1}{2}, \pm\frac{3}{2}, \pm\frac{5}{2}, \pm\frac{15}{2}, \pm 1, \pm 3, \pm 5, \pm 15\right\}$
59. 2 or 0 positive real zeroes; 1 negative real zero
60. odd function; symmetric with respect to the origin only