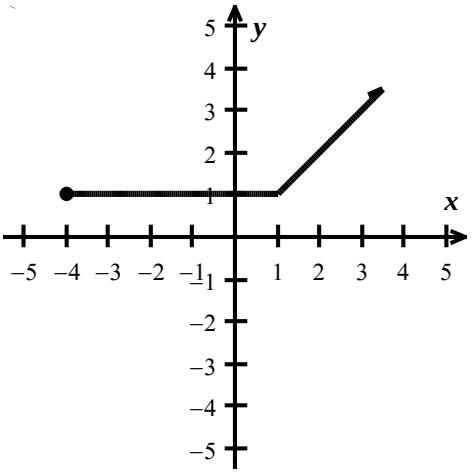
MATH 0310 Review for Final Exam

1. For the following graph of $f(x)$, determine:

   a. $f(-1)$

   b. the domain of $f(x)$

   c. the range of $f(x)$



1a_____

1b_____

1c_____

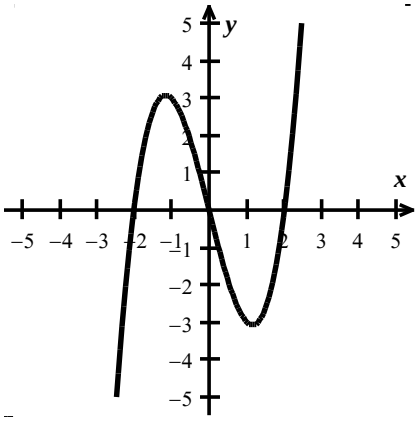
2. Use set-builder notation to write the domain for $f(x)=\dfrac{x+4}{x-5}$ 2 _____

3. Use interval notation to write the domain for $f(x)=3x^2-2x-1$ 3 _____

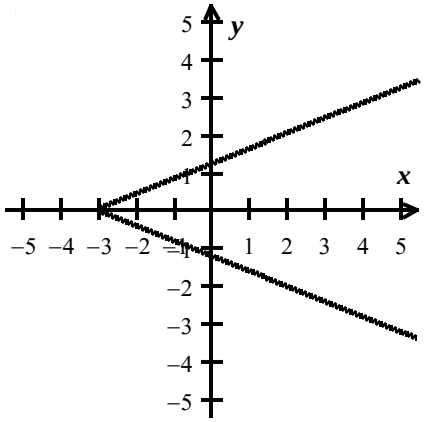
4. Determine whether each relation is a function. Answer yes or no.

4a_____ 4b _____ 4c _____

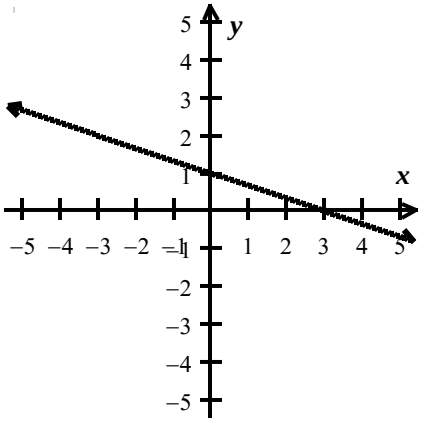
a



b



C



5. Factor completely:

   a. $5x^3-40x^2-45x$ 5a_____

   b. $8x^2-18$ 5b_____

   c. $6x^2+11x-10$ 5c_____

6. Determine whether each of the following is a function. Answer yes or no.

a) $\{(2,5),(1,-6),(8,4),(2,3),((5,7)\}$ 6a _____

b) $\{(1,5),(2,4),(3,5),(4,6)\}$ 6b _____

c) From this table of values 6c _____

x	- 2	- 1	7	1	2	3
y	- 8	- 3	2	7	12	- 3

7. Simplify: a. $\dfrac{9-\dfrac{1}{y^2}}{3-\dfrac{1}{y}}$

b. $\dfrac{\dfrac{1}{x-3}+\dfrac{1}{x+3}}{\dfrac{1}{x-3}-\dfrac{1}{x+3}}$ 7a_____

7b _____

8. Simplify: $\dfrac{2m^2+11m-21}{4m^2-9}$ 8 _____

A) $\dfrac{2m+7}{2m+3}$ B) $\dfrac{m-7}{2m+3}$ C) $\dfrac{m+7}{2m-3}$ D) $\dfrac{2m-7}{2m-3}$ E) $\dfrac{m+7}{2m+3}$

For problems 9 - 11, perform the indicated operation and simplify the answer.

9. $\dfrac{2a^2-7ab-15b^2}{2ab-10b^2}\cdot\dfrac{2a^2-3ab}{4a^2-9b^2}$ 9 _____

10. $\dfrac{2x^2-5x-7}{4x^2-9}\div\dfrac{5x^2+5x}{2x^2+3x}$ 10 _____

11. $\dfrac{5}{x^2-5x+6}-\dfrac{3}{4x-12}$ 11_____

12. $\dfrac{-5}{x^2-3x-4}+\dfrac{8}{x^2-16}$ 12_____

13. Solve: $\dfrac{x}{x+4}=\dfrac{18}{x^2+2x-8}-\dfrac{3}{x-2}$ 13_____

A) $x=-4$ B) $x=-2,4$ C) $x=-3$ D) $x=4$ E) $x=-3,2$

For problems 14 – 17, find the following, given that $f(x)=3x-6$ and $g(x)=x^2+1$.

14. $(g-f)(x)$ 14_____

15. $(f+g)(2)$ 15_____

16. $(f\cdot g)(x)$ 16_____

17. The domain of $\left(\dfrac{g}{f}\right)(x)$ 17_____

Solve #18, #19 and #20.

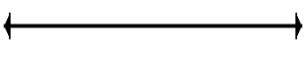
18. $|2x+4|=0$ 18_____

19. $|x-2|-5=11$ 19 _____

A) $x=14,-18$ B) $x=18$ C) $x=-14,18$ D) $x=\pm 4$ E) $x=\pm 18$

20. $|x-7|+9=2$ 20 _____

For problems 21 – 23, solve and graph the solution set on a number line. Then write the solution set in a) interval notation and b) set-builder notation.

21. $2x-5\le 5x+4$  21a_____

21b _____

22. $8-5x>18$  22a_____

22b _____

23. $-7\le x-2<4$  23a_____

23b _____

24. Let $f(x)=\sqrt{5-2x}$. Find:

a. $f(-10)$ b. $f(0)$ c. $f(3)$ 24a_____ 24b_____

d. State the domain of $f(x)$ 24c_____ 24d_____

For problems 25 – 28, assume *x* is nonnegative and simplify.

25. $\sqrt[3]{-27x^6y^8}$ 25_____

A. $-9x^2y^2\sqrt[3]{y^2}$ B. $-3x^2y^2$ C. $-3x^3y^5$ D. $-3x^2y^2\sqrt[3]{y^2}$ E. $-3x^3y^4$

26. $\sqrt{\frac{4x^{10}}{9}}$ 26_____

27. $\sqrt{-18}$ 27_____

28. $\sqrt[3]{-\frac{8x^8}{125x^2}}$ 28_____

For problems 29 – 35, perform the indicated operations and simplify.

29. $7x\sqrt{8x}-2x\sqrt{50x}$ 29_____

30. $\sqrt{27p}+\sqrt{75p}$ 30 _____

A) $\sqrt{102p^2}$ B) $p\sqrt{102}$ C) $3p\sqrt{8}$ D) $8\sqrt{3p}$ E) $8p\sqrt{3}$

31. $\sqrt{3}(5\sqrt{2}-\sqrt{6})$ 31 _____

32. $(\sqrt{3}-5)^2$ 32 _____

33. a. $(9-4i)-(1+6i)$ 33a_____

b. $(9-4i)(1+6i)$ 33b_____

34. a. Rewrite $\sqrt[6]{x^5}$ with rational exponents. 34a_____

b. Rewrite $x^{\frac{1}{2}}$ in radical notation. 34b_____

35. Rationalize each denominator:

a. $\sqrt{\frac{x}{3}}$ 35a_____

b. $\frac{4}{3+\sqrt{2}}$ 35b_____

c. $\frac{7}{3-i}$ 35c_____

Solve #36 and #37.

36. $x=\sqrt{5x+11}-1$ 36 _____

37. $\sqrt[3]{3x-1}=-4$ 37_____

Solve #38 – #41, using the indicated method.

38. factoring: $x^2+3x-18=0$ 38_____

39. square root property: $(x-3)^2=-49$ 39_____

40. completing the square: $x^2+4x=4$ 40_____

41. the quadratic formula: $2x^2-2x+5=0$ 41_____

A. $1\pm 3i$ B. $2,\ -1$ C. $\frac{1}{2}\pm\frac{3}{2}i$ D. $1\pm\sqrt{11}\ i$ E. $1\pm\sqrt{11}$

42. A ball is thrown upwards according to the following equation, $h(t) = -16t^2 + 80t$. When will it reach a height of 64 feet? 42_____

43. Normally, it takes Professor Thompson 3 hours to grade a class of final exam essays. If his graduate assistant grades the essays, it takes her 5 hours. How long will it take them to grade the essays together?

43_____

44. A biker can travel 18 mph with no wind. The same rider can bicycle 8 miles against the wind in the same time it takes to bicycle 12 miles with the wind. What is the speed of the wind? 44_____

A) 9 mph B) 3.6 mph C) none of these D) 90 mph E) 9 mph

45. Solve $3x^2 - 5x + 1 = 0$ using a calculator. Round the answer to three decimal places. 45_____

46. When a car comes to a sudden stop, you can determine the skidding distance (in feet) for a given speed (in miles per hour) by using the formula $d = 2\sqrt{5x}$, in which *d* is skidding distance and *x* is speed. Calculate the following, rounding the answers to the nearest tenth:

a) the skidding distance for a speed of 50 mph 46a _____

b) the speed when the skidding distance is 20 feet. 46b _____

47. Solve, writing the solution in the indicated notation

a) set-builder notation: $|x-5| \le 9$ 47a _____

b) interval notation: $|x-7| > 19$ 47b _____

48. For $f(x) = -x^2 + 2x + 3$:

a. find the vertex 48a_____

b. find the axis of symmetry 48b_____

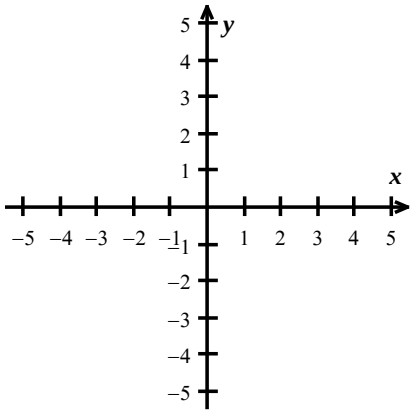
c. find the direction the parabola opens 48c_____

d. find the *y* - intercept 48d_____

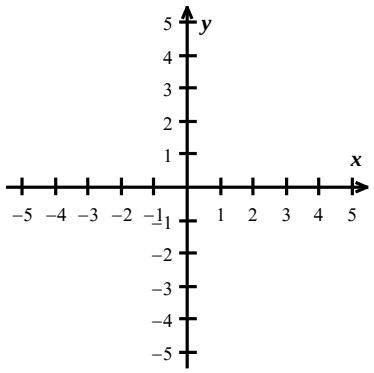
e. find the *x* - intercepts 48e_____

f. find the minimum or maximum value 48f_____

g. graph the function. 48g _____

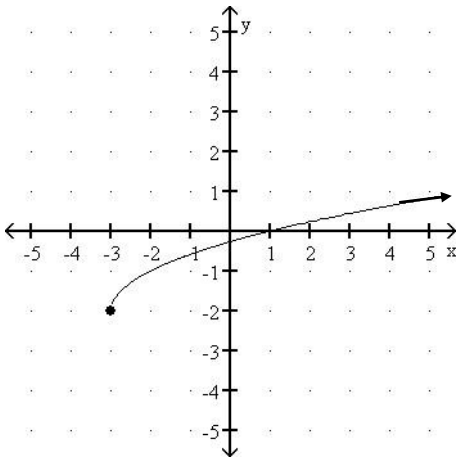


49. Graph $y = 5 - |x + 2|$ 49_____



50. For the following graph of function $f(x)$, 50a _____

a) find the domain b) find the range 50b _____



MATH 0310 FINAL EXAM REVIEW
ANSWER KEY

1. a) 1 b) $\{x|x \geq -4\}$ or $[-4, \infty)$
   c) $\{y|y \geq 1\}$ or $[1, \infty)$
2. $\{x|x \neq 5\}$
3. $(-\infty, \infty)$
4. a) yes b) no c) yes
5. a) $5x(x-9)(x+1)$
   b) $2(2x-3)(2x+3)$
   c) $(3x-2)(2x+5)$
6. a) no b) yes c) yes

26. $\frac{2x^5}{3}$
27. $3\sqrt{2}i$
28. $-\frac{2x^2}{5}$
29. $4x\sqrt{2x}$
30. D) $8\sqrt{3p}$
31. $5\sqrt{6} - 3\sqrt{2}$
32. $28 - 10\sqrt{3}$
33. a) $8 - 10i$ b) $33 + 50i$
34. a) $x^{\frac{5}{6}}$ b) $\sqrt{x}$

7. a) $\frac{3y+1}{y}$ b) $\frac{x}{3}$

8. E) $\frac{m+7}{2m+3}$

9. $\frac{a}{2b}$

10. $\frac{2x-7}{5(2x-3)}$

11. $\frac{-3x+26}{4(x-2)(x-3)}$

12. $\frac{3}{(x+1)(x+4)}$

13. C) $x=-3$

14. x^2-3x+7

15. 5

16. $3x^3-6x^2+3x-6$

17. $\{x|x\neq 2\}\ or\ (-\infty,2)\cup(2,\infty)$

18. $x=-2$

19. C) $x=-14,18$

20. no solution

21, 22, and 23—see graphing solutions on next page

24. a) 5 b) $\sqrt{5}$ c) i

d) $\left\{x\middle|x\leq\frac{5}{2}\right\}or\left(-\infty,\frac{5}{2}\right]$

25. D) $-3x^2y^2\sqrt[3]{y^2}$

35. a) $\frac{\sqrt{3x}}{3}$ b) $\frac{12-4\sqrt{2}}{7}$

c) $\frac{21}{10}+\frac{7}{10}i$

36. $x=5$

37. $x=-21$

38. $x=-6,3$

39. $x=3\pm 7i$

40. $x=-2\pm 2\sqrt{2}$

41. C) $x=\frac{1}{2}\pm\frac{3}{2}i$

42. $t=1$ second or $t=4$ seconds

43. $1\frac{7}{8}$ hours

44. B) 3.6 mph

45. $x=.232$ or $x=1.434$

46. a) 31.6 feet b) 20 mph

47. a) $\{x|-4\leq x\leq 14\}$

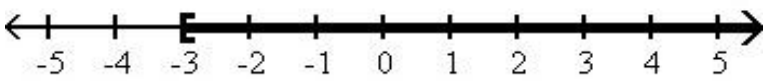
b) $(-\infty,-12)\cup(26,\infty)$

48,49--see graphing solutions on next page

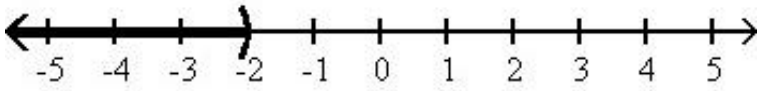
50. a) $[-3,\infty)$ b) $[-2,\infty)$

SOLUTIONS FOR GRAPHING PROBLEMS

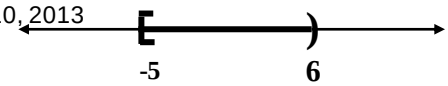
21. a) $[-3,\infty)$ b) $\{x|x\geq -3\}$



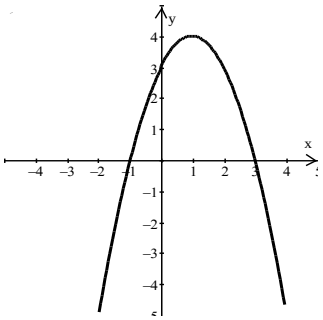
22. a) $(-\infty,-2)$ b) $\{x|x<-2\}$



23. a) $[-5,6)$ b) $\{x|-5\leq x<6\}$



48. a) (1,4) b) x=1 c) downward d) (0,3) e) (-1,0) and (3,0) f) maximum is 4
g) graph below



49.