48. Find all solutions of $\sqrt{x}-\sqrt{x-5}=1$.

A) $x=3$
B) $x=\sqrt{3}$
C) $x=6$
D) $x=9$
E) $x=-3$

$(\sqrt{x})^2=(1+\sqrt{x-5})^2$

$x=(1+\sqrt{x-5})(1+\sqrt{x-5})$

$x=1+2\sqrt{x-5}+(x-5)$

$x=x+2\sqrt{x-5}-4$

$0=2\sqrt{x-5}-4$

$4=2\sqrt{x-5}$

$2=\sqrt{x-5}$

$4=x-5$

$9=x$

49. Find all solutions of $|7x+2|=6$.

A) $x=\frac{8}{7},-\frac{4}{7}$
B) $x=\frac{4}{7},-\frac{8}{7}$
C) $x=\frac{4}{7}$
D) $x=\frac{3}{2},\frac{1}{2}$
E) $x=\frac{8}{7}$

$7x+2=6$ or $7x+2=-6$

$7x=4$ $\quad 7x=-8$

$x=4/7$ or $x=-8/7$

50. Find the x-intercepts of the graph of the equation $y=|-10x-5|-10$.

A) $\left(\frac{3}{2},0\right),\left(-\frac{1}{2},0\right)$
B) $\left(-\frac{3}{2},0\right),\left(-\frac{1}{2},0\right)$
C) $\left(-\frac{3}{2},0\right),\left(\frac{3}{2},0\right)$
D) $\left(-\frac{1}{2},0\right),\left(\frac{1}{2},0\right)$
E) $\left(-\frac{3}{2},0\right),\left(\frac{1}{2},0\right)$

$0=|-10x-5|-10$

$10=|-10x-5|$

$10=-10x-5$ or $-10=-10x-5$

$15=-10x$ $\quad -5=-10x$

$\frac{15}{-10}=x$ $\quad -5/10=x$

$-3/2=x$ $\quad 1/2=x$

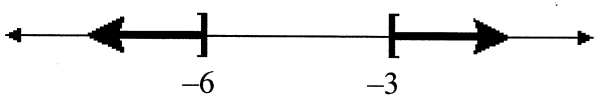
51. Find an equation that has $x = i, -i, -4$, and -3 as solutions.

A) $x^4 + 7x^3 + 13x^2 + 7x + 12 = 0$
B) $x^4 + 7x^3 + 11x^2 + 7x + 12 = 0$
C) $x^4 + x^3 + 13x^2 + 7x + 12 = 0$
D) $x^4 + x^3 + 11x^2 + 7x + 12 = 0$
E) $x^4 + 7x^3 + 13x^2 + x + 12 = 0$

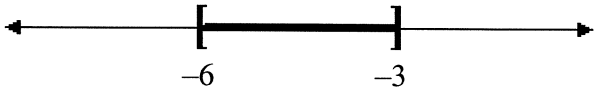
$(x-i)(x+i)(x+4)(x+3)$
$(x^2 - i^2)(x^2+7x+12)$
$(x^2+1)(x^2+7x+12$
$x^4+7x^3+12x^2+x^2+7x+12$
$x^4+7x^3+13x^2+7x+12$

52. Match the inequality $-6 < x < -3$ with its graph.

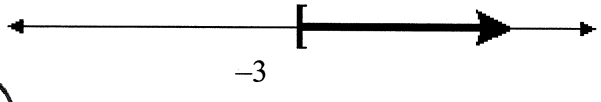
A)



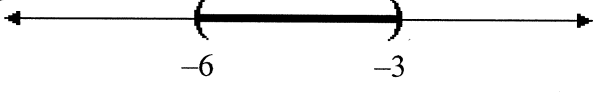
B)



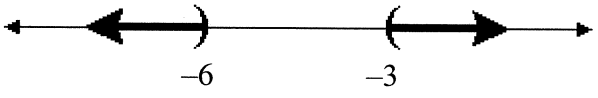
C)



D)



E)



53. Solve: $5(x-2) > 5x - 5$

A) $x > 5$
B) $-5 < x < 2$
C) $x \le -8$
D) $x < -2$
E) no solution

$5x - 2 > 5x - 5$
$-5x \quad -5x$
$-2 \not> -5$

54. Solve: $\frac{5x-1}{x-1} \geq 2$

A) $\left(-\infty, -\frac{1}{3}\right]$

B) $[1, \infty)$

C) $\left(-\infty, -\frac{1}{3}\right) \cup \left(-\frac{1}{3}, \infty\right)$

D) $\left(-\infty, -\frac{1}{3}\right] \cup (1, \infty)$

E) $\left[-\frac{2}{3}, 1\right) \cup (1, \infty)$

$\frac{5x-1}{x-1} - 2 \geq 0$

$\frac{5x-1}{x-1} - \frac{2(x-1)}{x-1} \geq 0$

$\frac{5x-1-2x+2}{x-1} = \frac{3x+1}{x-1} \geq 0$

crit #'s $x = 1$

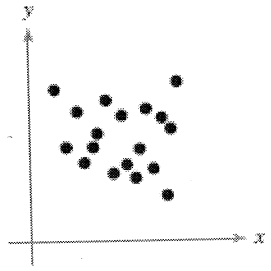
$x = -1/3$

$f(-1) = \frac{-3+1}{-2} = \frac{-2}{-2} = 1$ TRUE

$f(0) = \frac{1}{-1}$ FALSE

$f(2) = \frac{3(2)+1}{2-1} = \frac{7}{1}$ TRUE

55. Determine whether there is positive correlation, negative correlation, or no discernible correlation between the variables shown in the scatter plot below.



A) positive correlation

B) negative correlation

C) no discernable correlation

56. The average lengths L of cellular phone calls in minutes from 1999 to 2004 are shown in the table below.

Year	Average length, L (in minutes)
1999	2.38
2000	2.56
2001	2.74
2002	2.73
2003	2.87
2004	3.05

Use the *regression* feature of a graphing utility to find a linear model for the data. Let t represent the year, with $t = 9$ corresponding to 1999. Use the model to predict the average lengths of cellular phone calls for the year 2007. Round your answer to two decimal places.

A) 3.39 minutes $y = .122x + 1.319$
B) 6.78 minutes
C) 4.39 minutes
D) 2.39 minutes
E) 1.69 minutes

57. Write the equation f for the parabola in standard form with vertex $(-3,-1)$ and x-intercepts at -4 and -2. $(-4,0)$ $(-2,0)$

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

$y=a(x+3)^2-1$
$0=a(-2+3)^2-1$
$0=a(1)-1$
$1=a$

58. Write the standard form of the equation of the parabola that has a vertex at $(-5,7)$ and passes through the point $(6,9)$.

A) $f(x)=\frac{9}{121}(x+5)^2+6$

B) $f(x)=\frac{2}{121}(x+5)^2+7$

C) $f(x)=\frac{2}{25}(x-5)^2+7$

D) $f(x)=\frac{7}{6}(x-7)^2+9$

E) $f(x)=\frac{7}{25}(x-7)^2-6$

$y=a(x+5)^2+7$

$9=a(6+5)^2+7$

$9=a(11)^2+7$

$2=a(121)$

$a=2/121$

~~59~~. The path of a diver is...#56 in text.

60. Use long division to divide.

$(x^3+3x+4)\div(x-2)$

A) $x^2+2x+7+\frac{18}{x-2}$

B) $x^2-2x+7+\frac{10}{x-2}$

C) $x^2+5+\frac{1}{x-2}$

D) $x^2-5-\frac{1}{x-2}$

E) $x^2-2x-7-\frac{18}{x-2}$

$x-2\overline{)x^3+3x+4}$

$x^2+2x+7+\frac{18}{x-2}$

$-(x^3-2x^2)$

$2x^2+3x$

$-(2x^2-4x)$

$7x+4$

$-(7x-14)$

18

61. Use synthetic division to divide.

$(10+3x^3+37x+22x^2)\div(x+5)$

A) $3x^2+11x+10$

B) $3x^2+16x+3$

C) $3x^2+11x+5$

D) $3x^2+7x+2$

E) $3x^2+5x+6$

-5	3	22	37	10
		-15	-35	-10
	3	7	2	0

$3x^2+7x+2$

62. Use synthetic division to divide.

$$(x^3 - 12x + 16) \div (x - 2)$$

A) $x^2 + 2x - 8$

B) $x^2 - 2x - 12$

C) $x^2 + 4x + 4$

D) $x^2 + 6x + 8$

E) $x^2 + 4x - 4$

$2 \mid 1 \quad 0 \quad -12 \quad 16$

$\quad\quad 2 \quad 4 \quad -16$

$1 \quad 2 \quad -8 \quad 0$

$x^2 + 2x - 8$

63. If $f(x) = 3x^2 - 4x + 5$, use synthetic division to evaluate $f(3)$.

A) $f(3) = 16$

B) $f(3) = -34$

C) $f(3) = 2$

D) $f(3) = 20$

E) $f(3) = 44$

$3 \mid 3 \quad -4 \quad 5$

$\quad\quad 9 \quad 15$

$3 \quad 5 \quad 20$

$f(3) = 20$

64. Write the polynomial in completely factored form.

$$f(x) = x^4 + 5x^2 - 36$$

A) $f(x) = (x-2)(x+2)(x-3i)(x+3i)$

B) $f(x) = (x-1)(x+1)(x-2i)(x+2i)$

C) $f(x) = (x-3)(x+3)(x-i)(x+i)$

D) $f(x) = (x-2)(x+2)(x-i)(x+i)$

E) $f(x) = (x-1)(x+1)(x-3i)(x+3i)$

$(x^2)^2 + 5x^2 = 36$

$(x^2 - 4)(x^2 + 9)$

$(x-2)(x+2)(x+3i)(x-3i)$

$x^2 + 9 = 0 \quad x = \pm\sqrt{-9} = \pm 3i$

$x^2 = -9$

SKIP

65. Given $3 + i$ is a root, determine all other roots of $f(x) = x^4 - 2x^3 - x^2 - 38x + 130$.

A) $x = 3 + i, -2 \pm 3i, 2 - i$

B) $x = 3 - i, 2 \pm i$

C) $x = 3 - i, -2 - 3i, 2 + i$

D) $x = 3 - i, -3 \pm 2i$

E) $x = 3 - i, -2 \pm 3i$

66. Identify any horizontal and vertical asymptotes of the function below.

$$f(x)=\frac{2x-5}{|x|+3}$$

$|x|+3 \neq 0$

A) vertical asymptotes: $x=-2$ and $x=2$; horizontal asymptotes: $y=-3$ and $y=3$
B) vertical asymptotes: $x=-2$ and $x=2$; horizontal asymptotes: none
C) vertical asymptotes: $x=-3$ and $x=3$; horizontal asymptotes: none
D) vertical asymptotes: none; horizontal asymptotes: $y=-2$ and $y=2$
E) vertical asymptotes: $x=-3$ and $x=3$; horizontal asymptotes: $y=-2$ and $y=2$

67. Suppose the IQ scores (y, rounded to the nearest 10) for a group of people are summarized in the table below. Use the *regression* feature of a graphing utility to find a quadratic function of the form $y=ax^2+bx+c$ for the data.

IQ Score y	**Number of People** x
70	51
80	72
90	90
100	91
110	74
120	48
130	16

A) $y=-0.04x^2+14.75x-401.14$
B) $y=-0.06x^2+11.8x-471.93$
C) $y=-0.08x^2+10.74x-495.52$
D) $y=-0.07x^2+13.34x-448.33$
E) $y=-0.09x^2+8.38x-542.72$

68. Rewrite the exponential equation $4^{-2} = \frac{1}{16}$ in logarithmic form.

A) $\log_4 \frac{1}{16} = -2$

B) $\log_2 16 = -2$

C) $\log_4 16 = -2$

D) $\log_{16} 4 = -2$

E) $\log_4 \frac{1}{16} = 2$

$\log_4 \frac{1}{16} = -2$

69. Rewrite the logarithm $\log_4 29$ in terms of the natural logarithm.

A) $\frac{\ln 29}{\ln 4}$

B) $\frac{\ln 4}{\ln 29}$

C) $\ln 4 \ln 29$

D) $\frac{\ln 29}{\log_4 e}$

E) $\ln 29$

$\frac{\ln 29}{\ln 4}$

70. Use the properties of logarithms to expand the expression as a sum, difference, and/or constant multiple of logarithms. (Assume all variables are positive.)

$$\log_8 \frac{y}{2}$$

A) $2\log_8 y$

B) $y - \log_8 2$

C) $\log_8 y - 2$

D) $\frac{\log_8 y}{2}$

E) $\log_8 y - \log_8 2$

$\log_8 y - \log_8 2$

71. Use the properties of logarithms to expand the expression as a sum, difference, and/or constant multiple of logarithms. (Assume all variables are positive.)

$\ln \sqrt[6]{t}$

$\ln t^{1/6}$

$\frac{1}{6}\ln t$

A) $\frac{1}{6}\ln t$

B) $\ln t - \frac{1}{6}$

C) $\ln t - 6$

D) $\frac{1}{3}\ln t$

E) $\ln t - \frac{1}{3}$

72. Use the properties of logarithms to expand the expression as a sum, difference, and/or constant multiple of logarithms. (Assume all variables are positive.)

$\log_6 x^5 y^3 z^2$

$5\log_6 x + 3\log_6 y + 2\log_6 z$

A) $10\log_6 xyz$

B) $5\log_6 x + 3\log_6 y + 2\log_6 z$

C) $30\log_6 xyz$

D) $\log_6 x + \log_6 y + \log_6 z + 10$

E) $\log_6 x + \log_6 y + \log_6 z + 30$

73. Use the properties of logarithms to expand the expression as a sum, difference, and/or constant multiple of logarithms. (Assume all variables are positive.)

$\log_b \frac{\sqrt{x}y^2}{z^5} = \log_b \frac{x^{1/2}y^2}{z^5}$

$\frac{1}{2}\log_b x + 2\log_b y - 5\log_b z$

A) $\frac{\log_b x + 2\log_b y}{5\log_b z}$

B) $\frac{\log_b x + 4\log_b y}{5\log_b z}$

C) $\frac{1}{2}\log_b x + 2\log_b y - 5\log_b z$

D) $\frac{\log_b x + 4\log_b y}{10\log_b z}$

E) $\frac{\log_b x + 2\log_b y}{10\log_b z}$

74. Condense the expression $\log_3 x + \log_3 4$ to the logarithm of a single term.

A) $\log(4x)^3$

B) $\log_3 4x$

C) $\log_3 4^x$

D) $\log_3 x^4$

E) $\log_3(x+4)$

75. Condense the expression below to the logarithm of a single quantity.

$3\ln x + 2\ln y - 6\ln z$

$\ln \frac{x^3y^2}{z^6}$

A) $\ln\left(\left(\frac{xy}{z}\right)^{36}\right)$

B) $\ln \frac{x^3y^2}{z^6}$

C) $\ln \frac{xy}{z}$

D) $\ln\left(x^3 + y^2 - z^6\right)$

E) $\ln \frac{x^3 + y^2}{z^6}$

76. Solve the logarithmic equation below.

$$\ln(6x+3) = -3$$

A) $\dfrac{e^{-3}-3}{6}$

B) $\dfrac{e^{-3}+3}{6}$

C) $\dfrac{e^{3}-3}{6}$

D) $\dfrac{e^{3}+3}{6}$

E) $6e^{3}-18$

$e^{-3} = 6x+3$

$e^{-3} - 3 = 6x$

$\dfrac{e^{-3}-3}{6} = x$

77. Solve the equation $f(x) = g(x)$ algebraically.

$$f(x) = \ln e^{3x-7}$$
$$g(x) = 4x-4$$

A) –4
B) –1
C) –3
D) 4
E) –2

$\ln e^{3x-7} = 4x-4$

$3x-7 = 4x-4$

$-3 = x$

78. Solve the exponential equation below algebraically. Round your result to three decimal places.

$$\left(12+\frac{0.981}{14}\right)^{3t} = 34$$

A) 3.230
B) 1.622
C) 0.472
D) 4.784
E) –3.847

$\log_{(12+\frac{.981}{14})} 34 = 3t$

$\dfrac{\log 34}{\log 12+\frac{.981}{14}} \div 3 = t$

79. A sample contains 75 grams of carbon $\left({}^{14}C\right)$. ${}^{14}C$ has a half-life of 5715 years. How much ${}^{14}C$ remains after 2300 years? Round your answer to three decimal places.

A) 44.816 grams
B) 56.743 grams
C) 26.186 grams
D) 30.184 grams
E) 17.186 grams

$y = 75(1/2)^{t/5715}$

$y = 75(.5)^{\frac{2300}{5715}}$

80. A conservation organization releases 100 animals of an endangered species into a game preserve. The organization believes that the preserve has a carrying capacity of 1100 animals and that the growth of the herd will follow the logistic curve $p(t) = \dfrac{1100}{1+11e^{-0.1656t}}$, where t is measured in months. What is the population after 13 months? Round your answer to the nearest animal.

A) 11 animals
B) 961 animals
C) 833 animals
D) 789 animals
E) 483 animals

$P(13) = \dfrac{1100}{1+11e^{-.1656(13)}}$

$P(13) = 482.9$

Answer Key

1. A
2. D
3. B
4. C
5. B
6. B
7. D
8. D
9. D
10.
11. D
12. A
13. E
14. C
15.
16. B
17. C
18. B
19. D
20. C
21. C
22. E
23. A
24. B
25. E
26. A
27. E
28. A
29. D
30. C
31. D
32. A
33. E
34. D
35. A
36. A
37. A
38. D
39. C
40. E
41. E
42. B
43. C
44. D

45. E
46. B
47. D
48. D
49. B
50. E
51. A
52. D
53. E
54. D
55. C
56. A
57. D
58. B
59.
60. A
61. D
62. A
63. D
64. A
65. E
66. D
67. B
68. A
69. A
70. E
71. A
72. B
73. C
74. B
75. B
76. A
77. C
78. C
79. B
80. E