Calculus AB AP Review Packet

1. Expand: $(x+3)^3$

2. Expand: $(x^2-3)^3$

3. Simplify $\dfrac{3x+2y}{3x+y}$ if possible

4. Simplify $\dfrac{3x+2y}{3y}$ if possible

5. Simplify $\dfrac{5(x+h)^3-5x}{h}$

6. Convert $\dfrac{3a}{b}+b$ to a single fraction

7. Simplify $\dfrac{\dfrac{a}{2x+h}-\dfrac{a}{2x}}{h}$

8. Simplify $\dfrac{\dfrac{a}{b}-a}{a+\left(\dfrac{a}{b}\right)^2}$

9. Show that $\dfrac{x+4}{3x^2-7x}=\dfrac{\dfrac{1}{x}+\dfrac{4}{x^2}}{3-\left(\dfrac{7}{x}\right)}$

10. Simplify $\dfrac{(x-1)^2(3x-1)-2(x-1)\cdot 3}{(x-1)^4}$

11. Simplify $\dfrac{(x-1)(2x+1)-(x+3)}{(x-2)(3x+1)}$

12. Simplify $\dfrac{\dfrac{1}{(x+h)^2}-\dfrac{1}{x^2}}{h}$

Solve for x in problems 13-18

13. $x^2-4x+4=0$

14. $3x^2-7x+1=0$

15. $2x^2+3x-3=0$

16. $2x^2+3x+3=0$

17. $x^2-3x+4=0$

18. $\dfrac{3x+5}{(x-1)(x^4+7)}=0$

19. Solve for t: $\dfrac{d}{t+r}=\dfrac{5}{t}$

20. Solve for y_1: $xy_1+xy_1y^2-3=5y_1+xy$

21. Solve for $\dfrac{b}{t}$: $z-4-s\dfrac{b}{t}-3\dfrac{b}{t}=r^2\cdot\dfrac{b}{t}-\dfrac{b}{t}+9$

22. Solve for y^1: $xy^1-y^1y^2=\dfrac{x^2yy^1}{2}+2+3x+2xyy^1$

23. Solve for y_1: $\dfrac{x^2y_1+y_1}{x-1}=xyy_1+x^2y_1+1$

Solve for x in exercises 24-31.

24. $2x^4+3x^3-2x^2=0$

25. $(2x+1)(x-1)^2+(x+5)(2x+1)^2=0$

26. $(x+1)(2x+1)^3-3(2x+1)(x+1)=0$

27. $x^3+2x^2-x-2=0$

28. $x^4+3x^3-x^2-3x=0$

29. $5+2x^4+9x=7x^2+9x^3$

30. $\dfrac{x}{x+1}-\dfrac{1}{x+3}=\dfrac{1}{5x-1}$

31. $x^4+7x^2-8x=0$

In exercises 32-34, complete the square.

32. $3x^2+x$

33. $-2x^2-16x+18$

34. $-\dfrac{3}{5}x^2+\dfrac{3}{10}x+\dfrac{3}{10}$

In 35 and 36, rewrite the equation in the form $(x-h)^2+(y-k)^2=r^2$

35. $16x^2+16y^2-64y+8x+16=0$

36. $6x^2-6x+6y^2+10y+5=0$

37. Compute $\log_8 64$

38. Compute $\log_5\left(\dfrac{1}{25}\right)$

39. Express $\log_b \dfrac{(2x^2-3)(x^3+1)^2}{\sqrt{7x+1}}$ as a sum of logarithms.

40. Write as a logarithm of a single expression:

$$\frac{1}{2}\log_b(3x+1)-\frac{2}{3}\log_b(1-9x^2)+\log_b(1-x)$$

41. Write as a logarithm of a single expression:

$$\frac{3}{2}\log_b(2+x)^2-\frac{5}{2}\log_b(x^2-4)-\frac{2}{3}\log_b 27x+\frac{1}{3}\log_b 8x^2$$

Find the domain of the function in 42-45.

42. $f(x)=\dfrac{11}{x+5}$

43. $f(x)=\dfrac{1}{x^2+1}$

44. $f(x)=\dfrac{x}{x^2+x-2}$

45. $f(x)=\dfrac{x}{\sqrt{2-x-x^2}}$

46. Find $f(x)$ for the function f whose graph is a straight line with slope -2 passing through the point (1, -5).

47. Find the function whose graph is the straight line that passes through the point (-1, -2) and intersects the x-axis at 3.

48. Sketch the graph of the function $f(x)=\frac{1}{2}\sqrt{36-9x^2}$

49. Find the maximum value of the function $f(x)=4-x^2$

50. Find the minimum value of the function $f(x)=3x-x^2$ on the closed interval (-1, 1).

51. Does the function $f(x)=x+1$ attain a maximum value on the open interval (1, 3)?

52. Find the domain and range of $f(x)=\sin x$

53. Find the domain and range of $g(x)=\tan x$

54. Sketch the graph of the function $f(x)=\begin{cases} -2x, & x\le -2 \\ x^2-x-2, & -2<x<2 \\ -\frac{1}{2}x, & x\ge 2 \end{cases}$

In 55-68, compute the following:

55. $\cos\frac{\pi}{3}$ 56. $\csc\frac{\pi}{4}$ 57. $\tan\frac{\pi}{6}$ 58. $\sin\left(-\frac{\pi}{3}\right)$

59. $\cos\left(-\frac{\pi}{6}\right)$ 60. $\cos\left(\frac{\pi}{2}+\frac{\pi}{3}\right)$ 61. $\sin\frac{5\pi}{6}$ 62. $\cos\left(-\frac{3\pi}{4}\right)$

63. $\cos^2\frac{\pi}{4}$ 64. $\left(\cos\frac{\pi}{4}\right)^2$ 65. $\sin^2\left(-\frac{\pi}{4}\right)^2$ 66. $\tan^2 0$

67. $\arcsin\frac{\sqrt{3}}{2}$ 68. $\arccos(-1)$

69. Find the values of θ for which $\cos(6\theta)=0$

In 70-74, evaluate the expression at the specified value of x.

70. $\left(3x^3+3\right)^{-\frac{2}{3}}$, x = 2 71. $\left(4x^2-9\right)^{-\frac{4}{3}}$, x = 3 72. $\left(3x^2-2x-8\right)^{-\frac{3}{5}}$, x = 4

73. $\frac{1}{\left(x^2+4\right)^{-\frac{2}{3}}}$, x = 2 74. $\frac{1}{\left(\sqrt[3]{x}+6\right)^{\frac{2}{3}}}$, x = 8

75. Express $\sqrt{13}$ in terms of $\sqrt{2}$.

76. Show that $\frac{\sqrt{54}}{3} = \sqrt{6}$

77. Show that $\frac{\sqrt{48}}{\sqrt{3}} = 4$

78. Express $\frac{\sqrt{72}}{6}$ in simplest radical form.

79. Show that $\frac{\sqrt{108}}{9} = \frac{2}{\sqrt{3}}$

80. Express $\sqrt{9x^2+36}$ in the form $k\sqrt{x^2+a^2}$

81. Show that $\sqrt[3]{27x^3-8} = 3 \bullet \sqrt[3]{x^3-\left(\frac{2}{3}\right)^3}$

82. Express $\sqrt{\frac{x^2}{4}+4}$ in the form $k\sqrt{x^2+a^2}$

83. Show that $\sqrt{1+\frac{4}{9x^{\frac{2}{3}}}} = \frac{\sqrt{9x^{\frac{2}{3}}+4}}{3x^{\frac{1}{3}}}$

84. Show that $\sqrt{1+\left(\frac{x}{2}-\frac{1}{2x}\right)^2} = \frac{x}{2}+\frac{1}{2x}$

85. Express $\sqrt{23x^2-5}$ in the form of $k\sqrt{x^2+a^2}$

86. Show that $\sqrt{\left(\frac{\sqrt{x}}{2}+\frac{1}{2x}\right)^2-1} = \frac{\sqrt{x}}{2}-\frac{1}{2\sqrt{x}}$

For 87 and 88, write the expression in terms of $\sin\theta$ and $\cos\theta$.

87. $\frac{\csc\theta-\tan^2\theta}{\sec\theta-\cot\theta}$

88. $\tan\theta-\frac{1+\tan^2\theta}{\csc\theta+\cot\theta}$

In 89-92, find the equation of the given line.

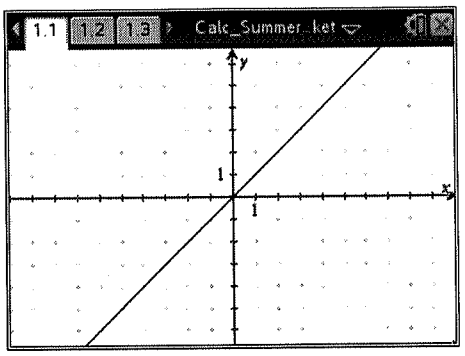
89. The straight line with the slope -2 passing through the point (-3, -5).

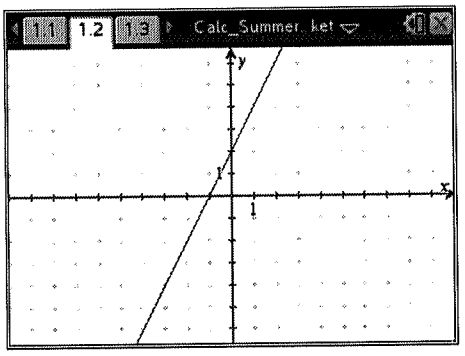
90. The straight line passing through (1, -3) that intersects the x-axis at the point whose coordinate is 5.

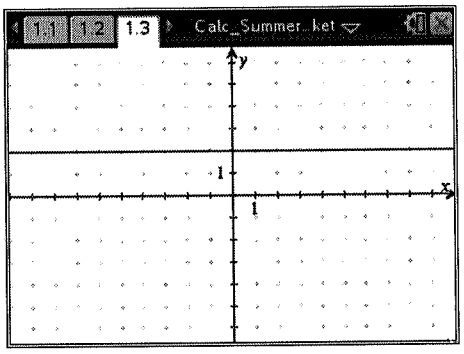
91. The straight line passing through the point (-1, -2) that is parallel to the line $x+y=2x-y+3$

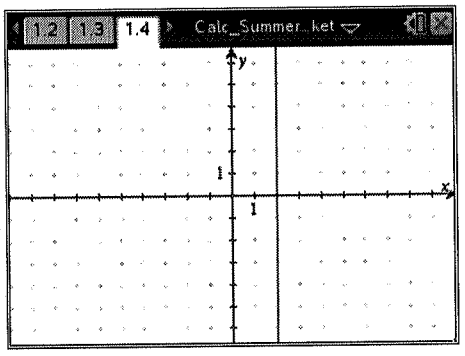
92. The straight line perpendicular to $x+y=2x+3$ that intersects the y-axis at the point whose coordinate is 2.

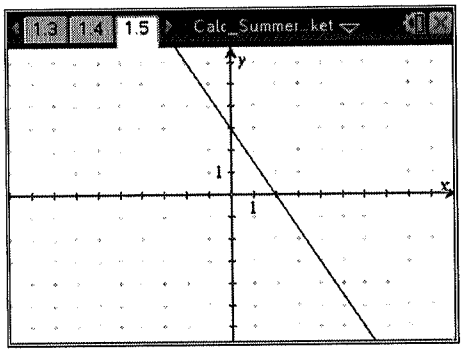
93. Find the equations of the indicated lines.











94. Find the equation of the circle shown.