

Exam 2 Preparation Ch 5 & 6 v02

There will be 25 questions on Exam 2.

Fourteen questions from chapter 5 and eleven questions from chapter 6.

No Book/No Notes/No Ipod/ No Phone/Yes Calculator/55 minutes

Name \_\_\_\_\_

$$6) f(x) = x^3 + 4$$

**Find the inverse of the given function.**

$$1) f(x) = x - 7$$

$$2) f(x) = -12x$$

$$3) f(x) = 5x - 5$$

$$4) f(x) = \frac{3x + 8}{5}$$

$$5) f(x) = 4(x - 7)$$

**Evaluate.**

$$7) \text{ Let } g(x) = 6^x. \text{ Find } g(4)$$

$$8) \text{ Let } g(x) = 3^x. \text{ Find } g^{-1}(81)$$

$$9) \text{ Let } f(x) = \log_2(x). \text{ Find } f(8)$$

$$10) \text{ Let } f(x) = \log_3(x). \text{ Find } f^{-1}(2)$$

**Solve the problem.**

- 11) Find the ratio of the amplitude of an earthquake with Richter number 7 to the amplitude of an earthquake with Richter number 3.
- 12) The loudness of sound can be measured on a decibel scale. The sound level  $L$  (in decibels) of a sound is given by  $L = 10\log\left(\frac{I}{I_0}\right)$ , where  $I$  is the intensity of the sound (in watts per square meter,  $W/m^2$ ) and  $I_0 = 10^{-12} W/m^2$ . A certain sound has intensity of  $4.14 \times 10^{-5} W/m^2$ . Find the decibel value of this sound? (Round to the nearest whole number.)
- 13) The pH of a solution ranges from 0 to 14. An acid has a pH less than 7. Pure water is neutral and has a pH of 7. The pH of a solution is given by  $pH = -\log(H^+)$  where  $H^+$  represents the concentration of the hydrogen ions in the solution in moles per liter. Find the pH if the hydrogen ion concentration is  $1 \times 10^{-5}$ .
- 14) The pH of a solution ranges from 0 to 14. An acid has a pH less than 7. Pure water is neutral and has a pH of 7. The pH of a solution is given by  $pH = -\log(H^+)$  where  $H^+$  represents the concentration of the hydrogen ions in the solution in moles per liter. Find the pH if the hydrogen ion concentration is  $5.7 \times 10^{-10}$ .
- 15) The pH of a solution ranges from 0 to 14. An acid has a pH less than 7. Pure water is neutral and has a pH of 7. The pH of a solution is given by  $pH = -\log(H^+)$  where  $H^+$  represents the concentration of the hydrogen ions in the solution in moles per liter. Find the pH if the hydrogen ion concentration is  $6.8 \times 10^{-4}$ .
- 16) Solve  $ab^{cx+d} + k = h$  for  $x$ . Assume that  $b > 0$ ,  $b \neq 1$ , and that the constants have values for which the equation has exactly one real number solution.
- 17) Solve  $ab^{cx-d} = k$  for  $x$ . Assume that  $b > 0$ ,  $b \neq 1$ , and that the constants have values for which the equation has exactly one real number solution.

18) Jeff received a gift from his grandfather of \$16,000, which he invested at an annually compounded interest rate of 4%. Let  $V = f(t)$  represent the value (in dollars) of the account after  $t$  years or any fraction thereafter. Find an equation for  $f$ . What will be the value of the investment in 8 years?

19) Jeff received a gift from his grandfather of \$3000, which he invested at an annually compounded interest rate of 8%. Let  $V = f(t)$  represent the value (in dollars) of the account after  $t$  years or any fraction thereafter. Find an equation for  $f$ . What will be the value of the investment in 8 years?

20) Bianca borrowed \$12,000 at a rate of 6% compounded annually. What was the total amount Bianca owed after 7 years?

21) Bianca borrowed \$12,000 at a rate of 11% compounded annually. What was the total amount Bianca owed after 4 years?

**Simplify. Write the expression as a single logarithm with a coefficient of 1.**

22)  $5 \log_b(x) - \log_b(y)$

23)  $\log_7(x - 4) - \log_7(x + 8)$

24)  $2 \log_x(4) + \log_x(3)$

25)  $\log_{11}(x + 9) + \log_{11}(x + 1)$

26)  $\log_7 25 + \log_7 3 - \log_7 15$

27)  $\log_8 20 + \log_8 5 - \log_8 25$

$$28) \log_9 4 + \log_9 (x^3 - 3) + \log_9 5$$

$$34) \log_{23} (318)$$

$$29) \log_8 5 + \log_8 (x^3 - 3) + \log_8 3$$

$$35) \log_{13} (62.8)$$

$$30) 5 \log_b (2x^7) - 3 \log_b (4x^4)$$

$$36) \log_{0.4} (20)$$

$$31) \frac{\log_4 (x)}{\log_4 (5)}$$

$$37) \log_{0.8} (20)$$

$$38) \log_{1/4} (2)$$

**Evaluate. Round your result to the fourth decimal place.**

$$32) \log_6 (15)$$

$$39) \log_{1/5} (2)$$

$$33) \log_6 (19)$$

**Find the natural logarithm.**

40)  $\ln(e^3)$

41)  $\ln(e^{10})$

42)  $\ln(e)$

43)  $\ln\left(\frac{1}{e^8}\right)$

44)  $\ln\left(\frac{1}{e^{11}}\right)$

45)  $\ln \sqrt[3]{e}$

**Solve the equation.**

46)  $\ln(x) = 6$

47)  $7 \ln(5x) = 28$

48)  $\ln(8) + \ln(x) = 0$

49)  $\ln(2) + \ln(x - 1) = 0$

50)  $8 + 9 \ln(x) = 16$

**Solve the equation. Round the solution to four decimal places, if necessary.**

51)  $e^{5x} = 3$

$$52) e^{(x+2)} = 8$$

Use "intersect" on a graphing calculator to solve the equation. Round the solution to the fourth decimal place.

$$58) 2e^x = 7 - 3x$$

$$53) \ln(5x) + \ln(6x) = 2$$

$$59) 2 \ln(x+5) = -3x + 8$$

$$54) 4 \ln(9x^5) + 2 \ln(2x^3) = 5$$

**Solve the problem.**

$$55) e^{5x-3} \cdot e^{5x} = 121$$

60) The function  $y = 600e^{-0.01155x}$  models the amount in pounds of a particular radioactive material stored in a concrete vault, where  $x$  is the number of years since the material was put into the vault. If 600 pounds of the material are initially put into the vault, how many pounds will be left after 190 years?

$$56) 9e^x - 28 = 3e^x + 59$$

61) The value of a particular investment follows a pattern of exponential growth. In the year 2000, you invested money in a money market account. The value of your investment  $t$  years after 2000 is given by the exponential growth model  $f(t) = 5900e^{0.061t}$ . How much did you initially invest in the account?

$$57) \ln(4x^{10}) - 3 \ln(x^3) = 4$$

62) The value of a particular investment follows a pattern of exponential growth. In the year 2000, you invested money in a money market account. The value of your investment  $t$  years after 2000 is given by the exponential growth model  $f(t) = 7100e^{0.067t}$ . When will the account be worth \$10,613?

$$67) (5x^4 + 8x^3 + 6x^2 - 5) + (4x^4 + 6x^3 + 7x^2 - 8)$$

$$68) (x^2 + 9x - 7) + (6x - 5)$$

63) The function  $y = 900e^{-0.00866x}$  models the amount in pounds of a particular radioactive material stored in a concrete vault, where  $x$  is the number of years since the material was put into the vault. If 900 pounds of the material are placed in the vault, how much time will need to pass for only 378 pounds to remain?

$$69) (6y + 6) + (7y^2 - 3y + 6)$$

$$70) (12x^2y - 4xy + 9) + (-11x^2y + 10xy - 8)$$

**Perform the addition or subtraction.**

$$64) (4x^4 + 3x^2) + (8x^4 + 7x^2)$$

$$71) (3x^2 + 9x + 3) - (7x^2 + 4)$$

$$65) (2x^5 + 6x^2) + (8x^5 + 4x^2 + 4)$$

$$72) (-9x^2 - 9) - (-x^3 - 2x^2 + 3)$$

$$66) (7x^5 - 7x^3 + 3x) + (7x^5 + 4x^3 + 9x)$$

**Find the function value.**

73) If  $Q(x) = 2x^2 - 7x + 8$ , find  $Q(-3)$ .

79)  $f(x) = x^2 + \frac{5}{4}x + 2$ ;  $g(x) = x^3 - \frac{1}{2}x^2 + x$

Find  $(f + g)(x)$ .

74) If  $Q(x) = 2x^2 + 7x - 5$ , find  $Q(0)$

**Evaluate the given function at the indicated value.**

80)  $f(x) = 5x^2 - 6x + 2$ ;  $g(x) = 4x - 6$

Find  $(f + g)(4)$ .

75) If  $P(x) = x^2 - 8x - 8$ , find  $P(5)$ .

81)  $f(x) = 3x^2 - 3$ ;  $g(x) = 2x^2 - 3x - 2$

Find  $(f + g)(2)$ .

76) If  $Q(x) = x^2 - 6$ , find  $Q(2)$ .

82)  $f(x) = 5x^2 - 4x - 8$ ;  $g(x) = 7x - 7$

Find  $(f + g)(4)$ .

77) If  $P(x) = -9x^2 + 8x$ , find  $P(-3)$ .

83)  $f(x) = -3x^2 - 3$ ;  $g(x) = x - 2$

Find  $(f - g)(-1)$ .

**Find an equation for the given function.**

78)  $f(x) = x - 3$ ;  $g(x) = 8x^2$

Find  $(f + g)(x)$ .

**Find the requested function.**

84) If  $f(x) = x^2 - 5x + 3$ , find  $f(x + 4)$ .

85) If  $f(x) = x^2 + 6x$ , find  $f(x + h)$ .

86) If  $f(x) = x^2 - 6x - 8$ , find  $f(x + h)$ .

87) If  $f(x) = x^2 + 9x - 8$ , find  $f(x + h) - f(x)$ .

90)  $f(x) = 2x + 3$ ,  $g(x) = -7x - 3$

Find  $(f \cdot g)(-5)$ .

91)  $f(x) = x - 4$ ,  $g(x) = -2x^2 + 18x + 5$

Find  $(f \cdot g)(2)$ .

92)  $f(x) = x + 12$ ,  $g(x) = x - 4$

Find  $(f \cdot g)(x)$  and  $(f \cdot g)(11)$ .

93)  $f(x) = x + 5$ ,  $g(x) = x^2 - 11x - 6$

Find  $(f \cdot g)(x)$  and  $(f \cdot g)(2)$ .

**Find the requested product.**

88)  $f(x) = 7x + 3$ ,  $g(x) = 9x + 1$

Find  $(f \cdot g)(x)$ .

89)  $f(x) = x - 7$ ,  $g(x) = x^2 - 8$

Find  $(f \cdot g)(x)$ .

**Factor when possible.**

94)  $5x^2 - 5x - 30$

95)  $2x^2 - 18x + 40$

$$96) 27y^2 + 63y + 30$$

$$102) 5x^2 - 5x - 30$$

$$97) 50x^2 - 140x + 98$$

$$103) 4x^2 - 12xy - 16y^2$$

$$98) 32x^2 - 80x + 50$$

$$104) 4y^3 - 12y^2 - 40y$$

$$99) 27a^2b + 9ab - 90b$$

$$105) 3x^3 + 6x^2 - 24x$$

$$100) 18y^2 + 54y + 40$$

$$106) -w^2 + 10w - 16$$

$$101) x^3 - x^2 - 72x$$

$$107) 10x^3 - 490x$$

$$108) x^2 - 6x + 36$$

$$114) 5x^2 - 25x + 30 = 0$$

$$109) 8x^3 - 8$$

$$115) 5x^3 + 3x^2 = 45x + 27$$

$$110) 3x^3 + 192$$

$$116) 3x(x - 2) = 8x^2 - 7x$$

$$111) 9x^5 - 9xy^2$$

$$117) x^2 - \frac{21}{11}x = \frac{x}{11}$$

$$112) 3x^5 - 3x$$

$$118) x^2 - \frac{5}{2}x = \frac{x}{2}$$

**Solve.**

$$113) x(3x + 13) = 10$$

**Find all x-intercepts.**

$$119) g(t) = t^2 + 7t - 60$$

120)  $s(p) = 2p^2 - 7p - 9$

121)  $f(x) = x^3 + x^2 - 42x$

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

125) The net income  $y$  (in millions of dollars) of Pet Products Unlimited from 1997 to 1999 is given by the equation  $y = 9x^2 + 15x + 52$ , where  $x$  represents the number of years after 1997. Assume this trend continues and predict the year in which Pet Products Unlimited's net income will be \$916 million.

126) A window washer accidentally drops a bucket from the top of a 256-foot building. The height  $h$  of the bucket after  $t$  seconds is given by  $h = -16t^2 + 256$ . When will the bucket hit the ground?

**Solve the problem.**

123) If the cost,  $C(x)$ , for manufacturing  $x$  units of a certain product is given by  $C(x) = x^2 - 10x + 9000$ , find the number of units manufactured at a cost of \$10,200.

127) An object is thrown upward from the top of a 160-foot building with an initial velocity of 48 feet per second. The height  $h$  of the object after  $t$  seconds is given by the quadratic equation  $h = -16t^2 + 48t + 160$ . When will the object hit the ground?

124) A manufacturer determines that the profit in dollars for manufacturing  $n$  units is  $P = 2n^2 - 60n - 320$ . (Assume that  $n$  is a positive integer) How many units are produced when the profit is \$480?

## Answer Key

### Testname: EXAM 2 PREPARATION CH 5 & 6V02

1)  $f^{-1}(x) = x + 7$

2)  $f^{-1}(x) = -\frac{1}{12}x$

3)  $f^{-1}(x) = \frac{x+5}{5}$

4)  $f^{-1}(x) = \frac{5x-8}{3}$

5)  $f^{-1}(x) = \frac{1}{4}x + 7$

6)  $f^{-1}(x) = \sqrt[3]{x-4}$

7) 1296

8) 4

9) 3

10) 9

11) 10,000

12) 76 decibels

13) 5

14) 9.24

15) 3.17

16)  $x = \frac{\log\left(\frac{h-k}{a}\right) - d \log(b)}{c \log(b)}$

17)  $x = \frac{\log\left(\frac{k}{a}\right) + d \log(b)}{c \log(b)}$

18)  $V = 16,000(1.04)^t$ ; \$21,897.10

19)  $V = 3000(1.08)^t$ ; \$5552.79

20) \$18,043.56

21) \$18,216.84

22)  $\log_b\left(\frac{x^5}{y}\right)$

23)  $\log_7\left(\frac{x-4}{x+8}\right)$

24)  $\log_x(48)$

25)  $\log_{11}(x+9)(x+1)$

26)  $\log_7 5$

27)  $\log_8 4$

28)  $\log_9(20x^3 - 60)$

29)  $\log_8(15x^3 - 45)$

30)  $\log_b\left(\frac{x^{23}}{2}\right)$

31)  $\log_5(x)$

32) 1.5114

## Answer Key

Testname: EXAM 2 PREPARATION CH 5 & 6V02

- 33) 1.6433
- 34) 1.8377
- 35) 1.6140
- 36) -3.2694
- 37) -13.4251
- 38) -0.5000
- 39) -0.4307
- 40) 3
- 41) 10
- 42) 1
- 43) -8
- 44) -11
- 45)  $\frac{1}{3}$
- 46)  $e^6$
- 47)  $\frac{e^4}{5}$
- 48)  $\frac{1}{8}$
- 49)  $\frac{3}{2}$
- 50)  $e^{8/9}$
- 51) 0.2197
- 52) 0.0794
- 53) 0.4963
- 54) 0.8195
- 55) 0.7796
- 56) 2.6741
- 57) 13.6495
- 58) 0.8199
- 59) 1.4264
- 60) 67 pounds
- 61) \$5900.00
- 62) 2006
- 63) 100 years
- 64)  $12x^4 + 10x^2$
- 65)  $10x^5 + 10x^2 + 4$
- 66)  $14x^5 - 3x^3 + 12x$
- 67)  $9x^4 + 14x^3 + 13x^2 - 13$
- 68)  $x^2 + 15x - 12$
- 69)  $7y^2 + 3y + 12$
- 70)  $x^2y + 6xy + 1$
- 71)  $-4x^2 + 9x - 1$
- 72)  $x^3 - 7x^2 - 12$
- 73) 47
- 74) -5
- 75) -23

## Answer Key

### Testname: EXAM 2 PREPARATION CH 5 & 6V02

76) -2

77) -105

78)  $(f + g)(x) = 8x^2 + x - 3$

79)  $(f + g)(x) = x^3 + \frac{1}{2}x^2 + \frac{9}{4}x + 2$

80) 68

81) 9

82) 77

83) -3

84)  $x^2 + 3x - 1$

85)  $x^2 + 2xh + h^2 + 6x + 6h$

86)  $x^2 + 2xh + h^2 - 6x - 6h - 8$

87)  $2xh + h^2 + 9h$

88)  $63x^2 + 34x + 3$

89)  $x^3 - 7x^2 - 8x + 56$

90) -224

91) -66

92)  $(f \cdot g)(x) = x^2 + 8x - 48$ ;  $(f \cdot g)(11) = 161$

93)  $(f \cdot g)(x) = x^3 - 6x^2 - 61x - 30$ ;  $(f \cdot g)(2) = -168$

94)  $5(x + 2)(x - 3)$

95)  $2(x - 4)(x - 5)$

96)  $3(3y + 2)(3y + 5)$

97)  $2(5x - 7)^2$

98)  $2(4x - 5)^2$

99)  $9b(3a - 5)(a + 2)$

100)  $2(3y + 5)(3y + 4)$

101)  $x(x + 8)(x - 9)$

102)  $5(x + 2)(x - 3)$

103)  $4(x + y)(x - 4y)$

104)  $4y(y + 2)(y - 5)$

105)  $3x(x - 2)(x + 4)$

106)  $-(w - 8)(w - 2)$

107)  $10x(x + 7)(x - 7)$

108) Prime

109)  $8(x - 1)(x^2 + x + 1)$

110)  $3(x + 4)(x^2 - 4x + 16)$

111)  $9x(x^2 + y)(x^2 - y)$

112)  $3x(x^2 + 1)(x + 1)(x - 1)$

113)  $x = \frac{2}{3}, -5$

114)  $x = 2, 3$

115)  $x = -3, -\frac{3}{5}, 3$

116)  $x = 0, \frac{1}{5}$

117)  $x = 0, 2$

## Answer Key

Testname: EXAM 2 PREPARATION CH 5 & 6V02

118)  $x = 0, 3$

119)  $(-12, 0), (5, 0)$

120)  $\left(\frac{9}{2}, 0\right), (-1, 0)$

121)  $(0, 0), (-7, 0), (6, 0)$

122)  $(-1, 0), (1, 0), (-2, 0)$

123) 40 units

124) 40 units

125) 2006

126) 4 sec

127) 5 sec