

Math 120 Final Exam

Practice Problems

Exam Date: Dec. 10

Chapter 2

For the following problems, graph each of the functions, give the domain/range, determine the intercepts. It will likely help to consider transformations of the form $f(x - a) + b$.

1) $G(u) = \sqrt{u + 4}$

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

3)

$$g(t) = \frac{2}{t - 4}$$

4) $h(u) = \sqrt{-5u}$

5) $f(x) = \sqrt[3]{x} - 2 - 1$

6) $f(x) = -x^2 + 2$

Graph each function. For those that are linear, determine the slope. For those that are quadratic, determine the vertex (the maximum or minimum).

14) $f(x) = 17 - 5x$

15) $g(t) = 5 - 3t - t^2$

16) $f(x) = 9 - x^2$

17) $f(x) = 3x - 7$

18) $h(t) = t^2 - 4t - 5$

19) $k(t) = -3 - 3t$

20) $F(x) = (2x - 1)^2$

21) $F(x) = -(x^2 + 2x + 3)$

Chapter 3

Determine the line which satisfies the following criteria.

7) Passes through $(-2, 3)$ and $(0, -1)$.

8) Passes through $(-1, -1)$ and is parallel to $y = 3x - 4$.

9) Passes through $(10, 4)$ and has slope $1/2$.

10) Passes through $(3, 5)$ and is vertical.

Solve the given systems. Some are linear and some are nonlinear.

22)

$$2x - y = 6$$

$$3x + 2y = 5$$

23)

$$8x - 4y = 7$$

$$y = 2x - 4$$

Determine whether the lines are parallel, perpendicular or neither.

24)

11) $x + 4y + 2 = 0$, $8x - 2y - 2 = 0$

12) $y - 2 = 2(x - 1)$, $2x + 4y - 3 = 0$

13) $x - 3 = 2(y + 4)$, $y = 4x + 2$

$$7x + 5y = 5$$

$$6x + 5y = 3$$

25)

$$\frac{1}{4}x - \frac{3}{2}y = -4$$

$$\frac{3}{4}x + \frac{1}{2}y = 8$$

26)

$$2x + \frac{3y + x}{3} = 9$$

$$y + \frac{5x + 2y}{4} = 7$$

27)

$$x^2 - y + 5x = -2$$

$$x^2 + y = 3$$

28)

$$y = \frac{18}{x + 4}$$

$$x - y + 7 = 0$$

29)

$$\sqrt{x} - y + 4 = 0$$

$$\frac{1}{3}\sqrt{2x} - 3y + 15 = 0$$

Solve the following word problems

30) If $f(x)$ is a linear function such that $f(-1) = 8$ and $f(2) = 5$, find $f(x)$.31) The demand function for a manufacturer's product is $p = 200 - 2q$, where p is the price per unit when q units are demanded. Find the level of production that maximizes the manufacturer's total revenue, and determine this revenue.

32) The difference in price of two items before a 5% sales tax is imposed is \$3.50. The difference in price after the sales tax is imposed is allegedly \$4.10. Show that this scenario is not possible.

33) If the supply and demand equations of a certain product are $120p - q - 240 = 0$ and $100p + q - 1200 = 0$, respectively, find the equilibrium price.34) Find the break-even point for a company which sells all the good in produces. Assume the variable cost per unit is \$3, fixed costs are \$1250, and the total revenue is $R(q) = 60\sqrt{q}$ where q is the number of units of output produced.35) A 6-year-old girl standing on a toy chest throws a doll straight up with an initial velocity of 15 feet per second. The height h of the doll in feet t seconds after it was released is described by the function $h(t) = -16t^2 + 16t + 4$. How long does it take the doll to reach its maximum height? What is the maximum height?

Chapter 4

Write each expression as a single logarithm

36) $3 \log 7 - 2 \log 5$

37) $5 \log x + 2 \log y + \log z$

38) $2 \log x + \log y - 3 \log z$

39) $\log_6 2 - \log_6 4 - 9 \log_6 3$

40) $\frac{1}{2} \log x + 2 \log x^2 - 3 \log(x+1) - 4 \log(x+2)$

Rewrite the expression in terms of $\log x$, $\log y$ and $\log z$

41)

$$\log \frac{x^3 y^2}{z^{-5}}$$

42)

$$\log \frac{\sqrt{x}}{(yz)^2}$$

43)

$$\log \left(\frac{xy^3}{z^2} \right)^4$$

44)

$$\log\left(\frac{1}{x}\sqrt{\frac{y}{z}}\right)$$

Solve for x

45) $\log(5x + 1) = \log(4x + 6)$

46) $\log 3x + \log 3 = 2$

47) $3^{4x} = 9^{x+1}$

48) $4^{3-x} = \frac{1}{16}$

49) $\log(\log_x 3) = 2$

50) $e^{3x} = 14$

51) $10^{3x/2} = 5$

52) $3(10^{x+4} - 3) = 9$

53) $4^{x+3} = 7$

Solve the following word problems

54) Bacteria in a jar grows according to $A(t) = A_0e^{\lambda t}$ where t is measured in days. Initially there are 600 bacteria, and after 1 day there are 700 bacteria. Determine $A(t)$.

55) Your investment in a company grows according to $I(t) = I_0e^{\lambda t}$ where t is measured in years. Your original investment was \$600 and after 16 months your investment is worth \$700. Determine $I(t)$.

56) 7 rabbits are put in a cage and asked to reproduce. Their population grows according to $P(t) = P_0e^{\lambda t}$ where t is measured in days. After 7 days, their population has doubled. In how many weeks will there be 400 rabbits.

57) The annual revenue for a company follows the equation $R(t) = 200e^{-t/5}$ where t is the number of years since the company was started. At what point will the company be making only 40 dollars? At what point will the company be making 0 dollars?

58) Suppose the value of an item satisfies the equation

$$V(t) = C\left(1 - \frac{1}{N}\right)^t$$

where t is measured in months, C is the cost of the item when purchased, and N is the maximum number of months the item can be used. If you bought a laptop for \$1800 and it will be dead in 4 years, after how many months will its value be \$700?