~~Test~~ Review
Midterm Review

Name: Key
Date:

1. For lunch you can eat either a turkey sandwich, a cheeseburger or a slice of pizza. Then for dessert, you can have either grapes or cookies. You also have water, coke, tea, or orange soda as your beverage options. How many different ways can you have your lunch?

$3 \cdot 2 \cdot 4 =$ **24 ways**

2. Expand the following $log \frac{3\sqrt{x}}{y^6}$

$\log 3 + \frac{1}{2}\log x - 6\log y$

3. Solve $3^{x+4} = 9$

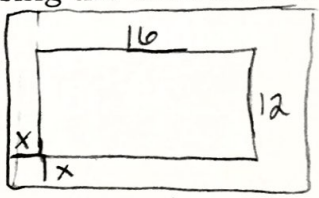
$3^{x+4} = 3^2$

$x + 4 = 2$

$x = -2$

4. A garden measuring 12 meters by 16 meters is to have a pedestrian pathway installed all around it, increasing the total area to 285 square meters. What will be the width of the pathway?

3 meters



$(x+12)(x+16) = 285$

$x^2 + 28x + 192 = 285$

$x^2 + 28x - 93 = 0$

$(x+31)(x-3)$

$x+31=0$ $x-3=0$

$x = -31, 3$

$x = 3$

5. Jason jumped off a cliff 480 feet above the water. He jumps from the cliff with an initial velocity of 16 ft/s. His height as a function of time could be modeled by the function $h(t) = -16t^2 + vt + s$ where h is his height above the water, t is the time, and v is his starting upward velocity and s is his starting height. $h(t) = -16t^2 + 16t + 480$

A. How long did it take for Jason to reach his maximum height?

.5 seconds

Graph, find maximum

B. What was the highest point that Jason reached?

484 feet

C. Jason hit the water after how many seconds?

6 seconds

6. Use the table provided to answer the following questions. Let 0 represent 1994 since 1994.

Year since 1994	Number
0	50
2	56
4	65
6	75
8	94
10	110

a. What is the quadratic regression equation?
$y = .40x^2 + 2.04x + 50.07$

b. In 2025 what is the number?
499.41

c. What year did the number 127 occur?
2005

d. What is the value of R^2 and what does this mean?
.997, very strong correlation

7. Find the zeros of $4x^3 + 12x^2 - 72x = 0$

$x = 0, 3, -6$

0 | 4 12 -72 0
0 0 0
4 12 -72 | 0

$4x^2 + 12x - 72 = 0$
$4(x^2 + 3x - 18) = 0$
$(x+6)(x-3) = 0$
$x = -6, 3$

8. You draw one card from a standard deck of playing cards. If you pick a heart, you will win $10. If you pick a face card, which is not a heart, you win $8. If you pick any other card, you lose $6. What is the expected value? Do you want to play? Explain

X	10	8	-6
P(X)	13/52	9/52	30/52

= .423

Yes, expected value is in player's favor

9. An agent sells life insurance policies to five equally aged, healthy people. According to recent data, the probability of a person living in these conditions for 30 years or more is 2/3. Calculate the probability that after 30 years:

a. All five people are still living
binompdf(5, 2/3, 5) = .132

b. At least three people are still living.
1-binomcdf(5, 2/3, 2)
= .79

c. Exactly two people are still living
binompdf(5, 2/3, 2) = .165

10. The probability of a man hitting the target at a shooting range is ¼. If he shoots 10 times, find the following probabilities.

a. What is the probability that he misses the target exactly three times?
binompdf(10, 3/4, 3) change p → 3/4
= .003

b. What is the probability that he misses the target at least once?
1-binomcdf(10, 3/4, 0) = .9999

11. Given the data below, answer the following questions

Length of a Fish (inches)	Weight of a Fish (ounces)
15	10
24	25
28	50
31	80
35	110
40	160

a. Find a cubic regression to represent the best model for

$y = -.009x^3 + .97x^2 - 25.79x + 208.47$

b. What would the weight of the fish be if it was 44 inches

193.65

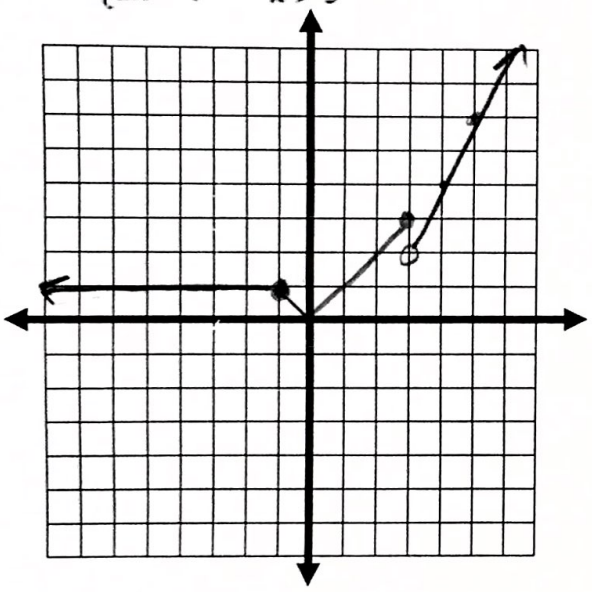
c. How long would a 4 POUND fish be?

64 ounces

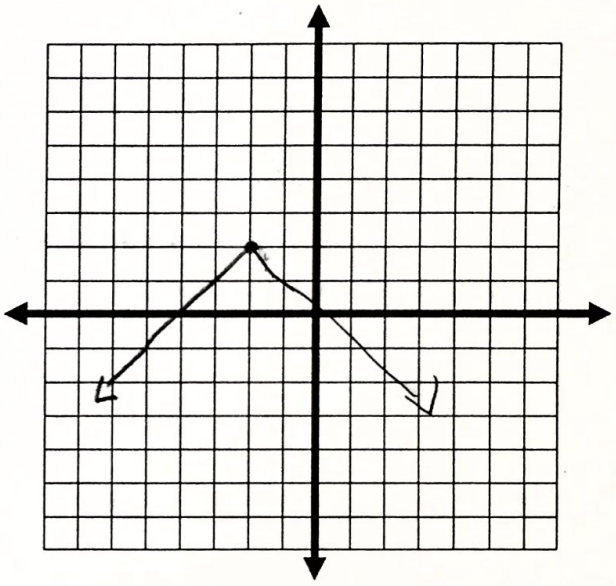
29.57 inches

Carefully graph each of the following.

12. $y = \begin{cases} 1 & x < -1 \\ |x| & -1 \le x \le 3 \\ 2x-4 & x > 3 \end{cases}$



$y = \begin{cases} x+4 & x \le -2 \\ -x & x > -2 \end{cases}$



13. Evaluate each for the given function

$f(x) = \begin{cases} -2x+1 & x \le 2 \\ 5x-4 & x > 2 \end{cases}$

f(-4) = 9

f(8) = 36

f(2) = −3

14. Vinny's pizza has a lot of large parties that come to the restaurant. For the birthday party package they charge $100 for a party of 10 or less. They charge $5 for each additional person.

a. Write a function that represents the cost of Vinny's Pizza Party Package.

$x \le 10 : 100$

$x > 10 : 100 + 5x$

b. How much would it cost for a party of 8? 15? 23?

$100 $125 $165

15. In the United States, 55% of children get an allowance and 41% of children get an allowance and do household chores. What is the probability that a child does household chores given that the child gets an allowance?

$\frac{.41}{.55} = .745$

16. The mean weight of 500 college students is 70 kg and the standard deviation is 3 kg. Assuming that the weight is **normally** distributed, determine how many students weigh:

a. Between 60 kg and 75 kg
~~64 kg~~ normalcdf(60, 75, 70, 3)
.9518

b. More than 90 kg
normalcdf(90, 99999, 70, 3)
1.315e-11

c. Less than 64 kg
normalcdf(-9999, 64, 70, 3)
.0228

17. Solve $\log_2(x-2) + \log_2(x-3) = 1$

$\log_2(x-2)(x-3) = 1$

$2^1 = x^2 - 5x + 6$ $\quad x^2 - 5x + 4 = 0$

$(x-4)(x-1) = 0$ $\quad x = 4, 1$

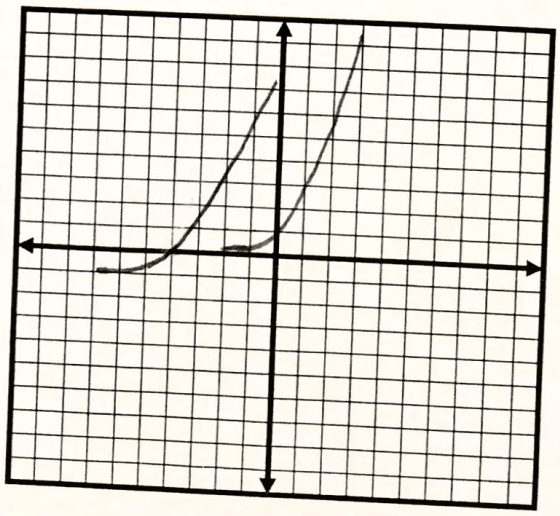
18. Find the inverse of each function
SKIP

a. $f(x) = \ln(3x+7)$.

b. $f(x) = 2^{x+3} - 1$

19. Graph the function $f(x) = 3^x$. Then, graph $f(x) = \left(\frac{1}{7}\right)(3^{x+4}) - 1$ and describe the transformation that occurred.

Less steep, left 4, down 1



In 1990, there 22.4 million residents of Hispanic origin living in the US. By 2000 it had increased to 35.3 million. The exponential function $A = 22.4e^{kt}$ describes the Hispanic population, A, in millions, t years after 1990.

$35.3 = 22.4e^{10k}$

a. Find k, correct to 3 decimal places.

$k = .045$

$\frac{35.3}{22.4} = e^{10k}$

$\ln\left(\frac{35.3}{22.4}\right) = 10k$

$k = \frac{\ln\left(\frac{35.3}{22.4}\right)}{10}$

b. Predict the Hispanic population in 2010. $t = 20$

$A = 22.4e^{20(.045)}$

55.1 million

Solve for t

c. In which year will the population reach 60 million?

$60 = 22.4e^{.045t}$

$2.6786 = e^{.045t}$

$.9853 = .045t$

$t = 21.89$ years

~ 2011

21. The following data represent the cooling of a cup of hot chocolate over time.

x	Time (t)	0	5	10	15	20
y	Temperature (°C)	60	54	48	44	41

a) Use exponential regression to find an equation of the type $T = a(b)^t$, where t = time (min) and T = temperature (°C). $y = 59.37(.981)^t$

b) After how many minutes, to the nearest tenth, would the temperature be 37°C?

$37 = 59.37(.981)^t$

$.6232 = .981^t$

$\log .981\ .6232 = t$

$t = 24.65$ minutes

c) What is the initial temperature of the hot chocolate?

60°C

22. Give an example of a categorical and quantitative variable.

C: Letter grade

Q: # of siblings

23. For a set of scores with a normal distribution, the mean is 60 and standard deviation is 8.

a. What value would be +2 standard deviations from the mean?

76

b. What percent of scores would be greater than a 70?

normalcdf(70, 99999, 60, 8) .1056

c. What percent of scores fall in the range of 42-74?

normalcdf(42, 74, 60, 8) .9477

24. Among 1000 college students surveyed, 400 of those students enjoy going to sport events. 350 of those enjoy going to art events, and 320 enjoy going to both events. What is the probability that a student selected at random enjoys going to a sporting event or enjoys going to an art event.

$400 + 350 - 320$

$\frac{430}{1000} = 43\%$

25. Given the following set of data, find the following:

3, 7, 8, 5, 12, 14, 21, 13, 18}.

Mean: 11.22 Lower quartile: 6 Upper Quartile: 16 Median: 12

Standard Deviation: 5.995 Range: 18

26. The function $f(x) = x^2 - 2$ is even, odd or neither?

$(-x)^2 - 2 \rightarrow x^2 - 2$ **Even**

27.

Answer	Dem.	Rep.
Support	150	106
Oppose	22	78
Refuse	28	16

probability dem. given they support

$$\frac{150}{256} = .586$$

28. 10th term $(x-2y)^{11}$

$_{11}nCr\ 9$

$\binom{11}{9}(x)^2(-2y)^9$

$55 \cdot x^2 \cdot -512y^9 = -28{,}160x^2y^9$

29. Jameson's scores were inconsistent: 100, 43, 74, 65, 36, 73, 91.
How many w/in 2 std. dev.

$\bar{x} = 68.86$

$S_x = 23.33$

$68.86 + 23.33 + 23.33 = 115.52$

$68.86 - 23.33 - 23.33 = 22.22$

All 7 between 22.22 + 115.52

30. 9 starters from 16 players. How many ways to choose the starters?

$16\ nCr\ 9$

11,440