

Prob/Stat/Discrete  
Review Packet A

Prob = area under curve

Name \_\_\_\_\_

z-score vs. x-value

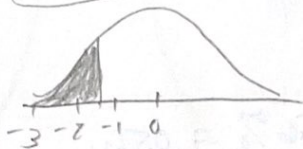
~~16.4~~  
~~16.5~~

1) Find  $P(z < -1.55)$

- a) 0.9394
- b) 0.0606
- c) 0.9778
- d) 0.0222

2<sup>nd</sup> DISTR  
↓ VARS ↓ z

normalcdf (-1000, -1.55, 0, 1)



2) In a recent year, the sophomore class taking the Nevada High School Proficiency Mathematics exam had a mean score of 340 with a standard deviation of 45. Assume that the scores are normally distributed. Find the probability that a student had a score higher than 353.

- a) 0.2136
- b) 0.3863
- c) 0.4864
- d) 0.8433

$P(X > 353)$

normalcdf (353, 10000, 340, 45)

3) A normal distribution has a mean of 86.2 and a standard deviation of 12.3. Find the probability of an x value more than 65.5.

- a) 0.9538
- b) 0.0458
- c) 0.9919
- d) 0.0081

normalcdf (65.5, 1000, 86.2, 12.3)

4) The average number of hours per week a high school student watches television is 12.5 hours, with a standard deviation of 2.4 hours. Find the probability of a student watching between 9.6 and 14.8 hours of television.

- a) 0.6257
- b) 0.7176
- c) 0.8083
- d) 0.4917

normalcdf (9.6, 14.8, 12.5, 2.4)

5) Find  $P(z > -0.34)$

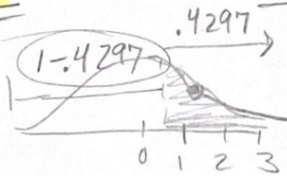
- a) 0.7704
- b) 0.2296
- c) 0.6331
- d) 0.8749

normalcdf (-0.34, 1000, 0, 1)

#7: change to 5.6%

6) The area to the right of a z-score is 0.4297. What is the z-score?

- a) 0.18
- b) 0.82
- c) -0.18
- d) -0.82



$$\text{invNorm}(0.5703, 0, 1) = .1771$$

7) The probability of being lower than a specific z-score is 4.9%. What is the value of the z-score?

- a) -1.57
- b) 1.57
- c) -1.59
- d) 1.59

area left



5.6% = .056  
0.49

$$\text{invNorm}(.056, 0, 1) = -1.655$$

-1.589

Changed prob.

8) What z-score is at the 40<sup>th</sup> percentile?

- a) 0.25
- b) -0.25
- c) 0.75
- d) -0.75



$$\text{invNorm}(.40, 0, 1) = -0.2533$$

9) SAT English scores are normally distributed with a mean score of 690 and a standard deviation of 75. What score is at the 85<sup>th</sup> percentile?

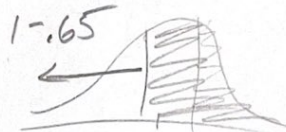
- a) Around 753
- b) Around 770
- c) Around 761
- d) Around 768



$$\text{invNorm}(.85, 690, 75) = 767.73$$

10) The mean home price in Reno is \$454,889, with a standard deviation of \$54,600. 65% of the homes in Reno are more expensive than John's home. What is the price of John's home?

- a) \$399,414.51
- b) \$433,850.50
- c) \$430,619.16
- d) \$475,577.23

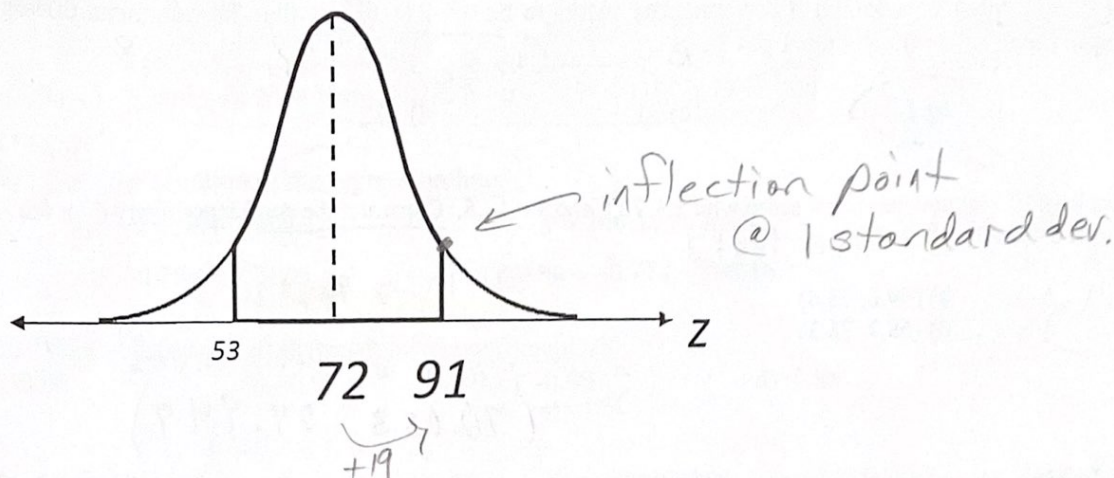


$$\text{invNorm}(.35, 454889, 54600)$$

$$433850.50$$



11) Estimate the standard deviation of the normal curve shown below.



a) 72

b) 21

c) 19

d) 53

12) The speeds of vehicles along a stretch of highway are normally distributed, with a mean of 71 miles per hour and a standard deviation of 8 miles per hour. Find the speed  $x$  corresponding to a z-score of 2.16.

a) 79.37

b) 84.26

c) 88.28

d) 85.72

$$z = \frac{x - \mu}{\sigma}$$

$$z \cdot \sigma = x - \mu$$

$$\mu + z \cdot \sigma = x$$

$$71 + 8 \cdot (2.16) = 88.28$$

13) Scores for the ASVAB (Armed Services Vocational Aptitude Battery) test are normally distributed, with a mean of 91 and a standard deviation of 4.3. To be eligible to join the military, you must score in the top 25%. What is the lowest score you can earn and still be eligible to enlist?

a) 94

b) 99

c) 101

d) 95



$$\text{invNorm}(.75, 91, 4.3) = 93.9$$

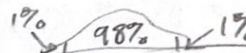
14) A random sample of 225 students has a grade point average with a standard deviation of 0.78. Find the margin of error if  $c = 0.98$ .  $\Rightarrow z_c = 2.326$

a) 0.15

b) 0.08

c) 0.11

d) 0.12



$$E = 2.326 \left( \frac{0.78}{\sqrt{225}} \right)$$

$$E = 0.12$$

Sampling error:  $\bar{x} - \mu$

Margin of error:  $E = z_c \cdot \frac{\sigma}{\sqrt{n}}$

$$n = \left( \frac{z_c \cdot \sigma}{E} \right)^2 = \left( \frac{(2.576)(3.3)}{1} \right)^2 = 72.26 \uparrow \text{Round up}$$

- 15) In order to set rates, an insurance company is trying to estimate the number of sick days that full time workers at an auto repair shop take per year. A previous study indicated that the standard deviation was 3.3 days. How large a sample must be selected if the company wants to be 99% confident that the true mean differs from the sample mean by no more than 1 day? = E

a) 141

b) 73

c) 31

d) 512

$$\rightarrow z_c = 2.576 \Rightarrow 2.58$$

(either works)

- 16) A random sample of 95 students has a test score with  $\bar{x} = 72.5$  and  $s = 14.5$ . Construct the confidence interval for the population mean,  $\mu$  if  $c = 0.90$ .  $n > 30$  Z-test

a) (71.9, 73.1)

b) (69.6, 75.4)

c) (70.1, 74.9)

d) (68.7, 76.3)

STAT  $\rightarrow$  Tests

$$70.1 \downarrow \text{Z-interval}$$

$$(70.053, 74.947)$$

- 17) A group of 40 bowlers showed that their average score was 225 with a standard deviation of 10. Find the 95% confidence interval of the mean score of all bowlers.

a) (219, 227)

b) (222, 228)

c) (226, 234)

d) (221, 229)

$$\text{Z-int Test}$$

$$(221.9, 228.1)$$

- 18) Construct a 95% confidence interval for the population mean,  $\mu$ . Assume the population has a normal distribution. In a recent study of 26 seniors, the mean number of hours per week that they spent doing homework was 15.1, with a standard deviation of 4.9 hours.  $n < 30 \Rightarrow t$  test

a) (14.6, 19.6)

b) (13.1, 17.1)

c) (14.1, 20.2)

d) (12.9, 21.3)

STAT  $\rightarrow$  Tests

$$\downarrow 8) \text{ T-int}$$

$$(13.121, 17.079)$$

- 19) The standard IQ has a mean of 100 and a standard deviation of 8. We want to be 95% certain that we are within 2 IQ points of the true mean. Determine the required sample size.

a) 153

b) 3

c) 21

d) 62

$$z_c = 1.96$$

$$E = 2$$

$$n = \left( \frac{z_c \cdot \sigma}{E} \right)^2$$

$$n = \left( \frac{(1.96)(8)}{2} \right)^2$$

$$n = 61.46 \uparrow \text{62}$$



Use the data for home prices for # 20 – 25.

Price (Thousands of \$)	\$150	\$175	\$200	\$220	\$240	\$260	\$280
Sales of New Homes This Year	145	119	99	75	82	43	24

STAT: EDIT

$$a = -.886$$

$$b = 276.9$$

$$r^2 = .96$$

$$r = -.98$$

20) Find the equation of the regression line.

- a)  $\hat{y} = -0.79x + 249.86$  b)  $\hat{y} = 246.16x + 0.77$   
 c)  $\hat{y} = -0.89x + 276.95$  d)  $\hat{y} = -0.77x + 246.16$

STAT → Calc  
 ↓  
 4: LinReg(ax+b)  
 WRITE all!

21) What is the value of the correlation coefficient,  $r$ ?

- a) 0.96 b) -0.97 c) -0.98 d) 0.88

22) Predict the number of new homes sold at a price of \$300,000.

- a) around 15 b) around 9 c) around 13 d) around 10

$$y = -0.89(300) + 276.95$$

$$y = 9.95$$

23) 200 homes are sold this year at a certain price. Use the regression line to estimate the price.

- a) around \$86,461 b) around \$74,502 c) around \$62,394 d) around \$59,948

SOLVE

$$200 = -0.89x + 276.95$$

$$-76.95 = -0.89x$$

$$86.46 = x \rightarrow 86,460$$

24) Find the residual value for a home priced at \$240,000.

- a) 19.74 b) -19.74 c) 18.65 d) -18.65

$$\text{residual} = \text{actual} - \text{predicted}$$

$$= 182 - 163.35$$

$$y = -0.89(240) + 276.95$$

$$y = 63.35$$

25) What percentage of the variation in the data can be explained by the regression line?

- a) 96% b) 98% c) 79% d) 83%

$$r^2 = .96 = 96\%$$

26) A collection of a set of data ( $x$ ) has a mean 14 with a standard deviation of 4.8. Another variable ( $y$ ) has a mean of 28 with a standard deviation of 2.3. The correlation coefficient is 0.94. Find the equation of the linear regression line.

- a)  $\hat{y} = -1.96x + 55.44$   
 b)  $\hat{y} = 1.96x + 0.56$   
 c)  $\hat{y} = -0.45x + 34.3$   
 d)  $\hat{y} = 0.45x + 21.7$

$$\text{slope } a = r \cdot \frac{s_y}{s_x} = 0.94 \left( \frac{2.3}{4.8} \right) = .45$$

$$\text{y-int } b = \bar{y} - a \cdot \bar{x} = 28 - (.45)(14) = 21.7$$

27) Jack and Sara borrow \$25,000 for a down payment on their house. The loan is calculated at a simple interest rate of 7.5%. If they pay back the loan in 18 months, how much interest will they pay?

$$\frac{18 \text{ mo}}{12 \text{ mo}} = 1.5 \text{ yr} \quad I = P \cdot r \cdot t = 25,000 (0.075) (1.5) = \$2812.50$$



FORMULA!

28) An investment is made of \$4000, and the future value of the investment is \$4780 after three years. Find the simple interest rate of the investment.

$$4780 = 4000 + r \cdot 3$$

$$780 = 12000r$$

$$r = 0.065$$

6.5%

Use the following for #29 and 30: John's parents open a bank account on his 2<sup>nd</sup> birthday. They put \$3000 in the account, which has an interest rate of 4.5% compounded monthly.

29) How much money will be in the account on John's 18<sup>th</sup> birthday? *16 years*

$$A = 3000 \left(1 + \frac{.045}{12}\right)^{12 \cdot 16} = 6155.01$$

30) How much interest was earned over the life of the investment?

$$\begin{array}{r} 6155.01 \\ - 3000.00 \\ \hline 3155.01 \end{array}$$

31) Heidi would like to save \$25,000 so that she can make a down payment on a home. How much should she invest in an account with 8% interest that is compounded monthly, so that she can reach her goal in four years?

Formula!

$$25000 = P \left(1 + \frac{.08}{12}\right)^{48}$$

$$P = 18173.01$$

32) In order to save for retirement, Jack makes a periodic deposit of \$600 into an annuity account that earns an interest rate of 5.5% compounded semiannually. How much money will be in this account after 25 years?

$$A = \frac{600 \left( \left(1 + \frac{.055}{2}\right)^{2 \cdot 25} - 1 \right)}{\left(\frac{.055}{2}\right)} = \$62887.02$$

For #33, use the stock table for Netflix.

52 week high	52 week low	Stock	Sym	Div	Yld%	PE Ratio	Vol 100s	Hi	Lo	Close	Net Chg
28	12	NTF	ICR	0.43	1.7	22	9420	28	26.5	25	...

33) What is the annual earnings per share for Netflix?

*\$0.43*

$$\frac{\text{yesterday Close (per share)}}{\text{PE ratio}} = \frac{25}{22} = 1.136$$

*\$1.14*



- 34) The cost of a new 70 inch Sony 4k Ultra HDTV is \$3000 (on sale). We can finance this by paying \$750 down and \$244.99 per month for 12 months. Determine the finance charge.  $\rightarrow$  interest

$$\begin{array}{r} 3000 \\ - 750 \\ \hline 2250 \\ \text{amt} \\ \text{financed} \end{array} \quad \begin{array}{r} 750 + 244.99(12) \\ = 3689.88 \\ \text{Total installment} \\ \text{price} \end{array} \quad \begin{array}{r} 3689.88 \\ - 3000 \\ \hline 689.88 \text{ finance} \\ \text{charge} \end{array}$$

- 35) A particular credit card calculates interest using the unpaid balance method. The monthly interest rate is 2.34% on the unpaid balance on the first day of the billing period less payments and credits. Here are some of the details in the July 1-July 31 itemized billing.

July 1 Balance; \$1550

Payment Received July 10: \$500

Purchases Charged to the VISA Account: Dinner, \$78; flight ticket, \$410; hotel room, \$270

Last day of the billing period: July 31

Payment Due Date: August 9

$$\begin{array}{r} 1550 \\ - 500 \\ \hline 1050 \end{array} \quad \rightarrow \text{Int: } (.0234)(1050) = 24.57$$

$$1050 + 24.57 = 1074.57$$

The monthly payment is calculated in the following way: If the balance is less than \$600, the monthly payment is \$15. If the balance is more than \$600, the monthly payment is  $\frac{1}{36}$  of the total balance on the account, rounded to the nearest dollar. Find the amount of the minimum monthly payment.

$$\frac{1}{36} \cdot \frac{1832.57}{1} = \frac{1832.57}{36} = 50.90$$

\$51

For #36 - 37: The price of a home is \$340,000. The bank requires a 20% down payment. After the down payment, the balance is financed with a 30-year fixed-rate mortgage at 5.5%.

- 36) Determine the monthly mortgage payment to the nearest dollar.

Step 1  $.20(340,000) = 68,000$  down

$$\begin{array}{r} 340,000 \\ - 68,000 \\ \hline P = 272,000 \end{array}$$

$$\text{PMT} = \frac{272,000 \left( \frac{.055}{12} \right)}{\left( 1 - \left( 1 + \frac{.055}{12} \right)^{-12 \cdot 30} \right)} = 1544.39 \rightarrow \$1544$$

- 37) How much interest will be paid during the life of the mortgage?

$$(1544.39)(30)(12) = 555840$$

$$\begin{array}{r} 555840 \\ - 272000 \\ \hline 283840 \end{array}$$

- 38) How long will it take an investment of \$2000 at 5% compounded continuously to grow to \$6000?

$$6000 = 2000 e^{.05t}$$

$$\ln 3 = \ln e^{.05t}$$

$$\frac{\ln 3}{.05} = \frac{.05t}{.05}$$

$$t \approx 22 \text{ years}$$