

**Version A**  
**Blue/White**

1. B
2. C
3. C
4. A
5. B
6. D
7. C
8. C
9. B
10. C
11. B
12. A
13. A
14. C
15. C
16. B
17. A
18. C
19. D
20. D
21. B
22. B
23. C

**Version B**  
**Green/Yellow**

1. A
2. A
3. D
4. B
5. A
6. B
7. B
8. C
9. E
10. B
11. B
12. E
13. A
14. C
15. D
16. A
17. C
18. A
19. C
20. B
21. A
22. B
23. D

Version A – (Blue/White)

Multiple Choice

1. Calculate the mean,  $\bar{x}$ , and the standard deviation,  $s$ , in the following frequency table:

Scores	Frequency	Class Marks
20 – 34	5	27
35 – 49	10	42
50 – 64	25	57
65 – 79	10	72

First, you must calculate the Class Marks.

$$\text{Class Mark} = \frac{\text{Low} + \text{High}}{2}$$

Enter the Class Marks in  $L_1$  and the Frequencies in  $L_2$ .

Stat → Calc → 1 - Var Stats →  $(L_1, L_2)$

$$\bar{x} = 54, \quad s_x = 13.21$$

The correct answer is **b**.

2. Given,  $\mu = 63.6$  and  $\sigma = 2.5$ ,  $\Pr(x \geq 68.6)$

$$z = \frac{68.6 - 63.6}{2.5} = \frac{5}{2.5} = 2 \sim .4772$$

$$\begin{array}{r} .5000 \\ - .4772 \\ \hline .0228 \end{array}$$

$$\therefore \Pr(x \geq 68.6) = .0228$$



Area = .0227  
low = 2      up = 4

The correct answer is **c**.

3. Given  $\mu = 173$  and  $\sigma = 30$ . If a sample of size  $n = 32$  is chosen, find  $\Pr(173 \leq \bar{x} \leq 186)$ .

Calculate  $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{30}{\sqrt{32}}$

$$\sigma_{\bar{x}} = 5.3$$

$$z_{\bar{x}} = \frac{x - \mu}{\sigma / \sqrt{n}} = \frac{186 - 173}{30 / \sqrt{32}} = 2.45 \sim .4929$$

$$\therefore \Pr(173 \leq \bar{x} \leq 186) = .4929$$

The correct answer is **c**.



Area = .4929  
low = 0      up = 2.45

4. Given  $\bar{x} = 275$  and  $s_x = 60$  with a sample of  $n = 1077$ , determine a 99% C.I. Use  $z_c = 2.58$ .

$$\begin{aligned}
 99\% \text{ C.I.} &\longrightarrow \bar{x} \pm z_c \left( \frac{s_x}{\sqrt{n}} \right) \\
 &\longrightarrow 275 \pm 2.58 \left( \frac{60}{\sqrt{1077}} \right) \\
 &\longrightarrow 275 \pm 4.72 \\
 &\longrightarrow 270.28 \longleftrightarrow 279.72
 \end{aligned}$$

Thus,  $270.28 \leq \mu \leq 279.72$ .

The correct answer is a.

5. Given the following data set for weight and gas mileage, determine the linear regression equation (correct to 3 decimal places) and use it to predict the gas mileage for a car that weighs 4.9 thousand pounds.

$x$	2.5	3.0	4.0	3.5	2.7	4.5	3.8	2.9	5.0	2.2
$y$	40	43	30	35	42	19	32	39	15	44

Enter the  $x$ -values into  $L_1$  and the  $y$ -values into  $L_2$ . Look at the StatPlot of the data. Calculate the Linear Regression Model.

Stat  $\longrightarrow$  Calc  $\longrightarrow$  Lin Reg ( $ax + b$ )  $\longrightarrow$  ( $L_1, L_2$ ).

Graph the Model.

Use 2<sup>nd</sup> Trace  $\longrightarrow$  Value  $\longrightarrow$   $x = 4.9$ . ( $y = 18$ )

The correct answer is b.

6. Given the histogram, determine the mode. The mode is the most frequently occurring score as indicated by the highest bar.

Thus, the score is 6.

The correct answer is d.

7. The statement that best describes the histogram is “it shows data that is approximately normally distributed.”

The correct answer is c.

8. The distribution with the largest standard deviation is the one that is most spread out.

The correct answer is **c**.

9. Given the following scatter plot of data, this is clearly linear with a negative slope and the relationship depicted is:

a strong negative correlation.

The correct answer is **b**.

10. Solve for the slope of  $3x - 2y = 5$ .

$$3x - 2y = 5$$

$$3x - 5 = 2y$$

$$2y = 3x - 5$$

$$y = \frac{3}{2}x - \frac{5}{2}$$

$$\text{Thus, } m = \frac{3}{2}$$

Given the point  $\left(\frac{1}{4}, \frac{2}{3}\right)$ , write the equation of the line through the point that is perpendicular to  $3x - 2y = 5$ .

Since the line is perpendicular, we use  $m = -\frac{2}{3}$  and the pt  $\left(\frac{1}{4}, \frac{2}{3}\right)$ .

Use the pt-slope equation.  $y - y_1 = m(x - x_1)$

$$y - \frac{2}{3} = -\frac{2}{3}\left(x - \frac{1}{4}\right)$$

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

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

$$y = -\frac{2}{3}x + \frac{1}{6} + \frac{4}{6}$$

$$y = -\frac{2}{3}x + \frac{5}{6}$$

The correct answer is **c**.

11. Solve  $(x+1)^2 + 5 = (x+3)^2$

$$x^2 + 2x + 1 + 5 = x^2 + 6x + 9$$

$$x^2 + 2x + 6 = x^2 + 6x + 9$$

$$2x + 6 = 6x + 9$$

$$-4x = 3$$

$$x = -\frac{3}{4}$$

Thus, the solution is between  $-1$  and  $0$ .

The correct answer is b.

12. Which of the following represent  $y$  as a function of  $x$ .

Every element in the domain must have a unique element in the range.

Thus, this is true for only I.

The correct answer is a.

13. Solve  $3(x+10) \leq 12(x+1)$

$$3x + 30 \leq 12x + 12$$

$$18 \leq 9x$$

$$2 \leq x$$

$$\text{or } x \geq 2$$

The correct answer is a.

14. Solve  $(x-5)(x+2) = 8$

$$x^2 - 3x - 10 = 8$$

$$x^2 - 3x - 18 = 0$$

$$(x-6)(x+3) = 0$$

$$x = 6, x = -3$$

Sum = 3      The correct answer is c.

15. Given the function for height, determine the maximum height.

$$s = -16t^2 + 256t + 3$$

$$\text{Vertex } \left( \frac{-256}{-32}, \quad \right) \longrightarrow (8, 1027)$$

$$-b/2a$$

$$s = -16(8)^2 + 256(8) + 3$$

$$s = -1024 + 2048 + 3$$

$$s = 1027$$

Thus, the maximum height is 1027 ft.

The correct answer is **c.**

16. Given the vertex of  $(-2, 5)$  and another pt. at  $(2, -3)$  determine the quadratic function.

$$y = a(x-h)^2 + k$$

$$\text{Replace } (h, k) \quad y = a(x+2)^2 + 5$$

$$\text{Replace } (x, y) \quad -3 = a(2+2)^2 + 5$$

$$-3 = 16a + 5$$

$$-8 = 16a$$

$$-\frac{1}{2} = a \quad \text{thus, the equation is } y = -\frac{1}{2}(x+2)^2 + 5$$

The correct answer is **b.**

17. Determine the population after 5 years given the model,

$$\left. \begin{array}{l} N = \frac{1000}{1 + 9e^{-.166t}} \\ N = \frac{1000}{1 + 9e^{-.166(5)}} \end{array} \right\} \text{Evaluate on calculator.}$$

$$N = 203$$

The correct answer is **a.**

18. Given \$6000 invested at 7% compounded continuously, determine how long it will take to triple.

$$6000e^{.07t} = 18,000$$

$$e^{.07t} = 3$$

$$t = \frac{\ln 3}{.07}$$

$$t \approx \underline{16 \text{ years}}$$

The correct answer is **c.**

19. Evaluate  $\log_2 15$ . (Round to 2 decimal places).

Use Change of Base Formula.

$$\log_2 15 = \frac{\log 15}{\log 2} = \underline{3.91}$$

The correct answer is **d**.

20. Simplify  $\ln e^{5-x}$ .

$$\ln e^{5-x} = (5-x) * \ln e = (5-x) * 1 = \underline{5-x}$$

The correct answer is **d**.

21. Rewrite the expression as the logarithm of a single quantity.

$$\frac{1}{2} \log_5 (x^2 + 4) - 3 \log_5 x = \log_5 \left[ \frac{\sqrt{x^2 + 4}}{x^3} \right]$$

Using properties of logs. 

The correct answer is **b**.

22. Solve for  $x$ :  $5e^x - 8 = 40$

$$5e^x = 48$$

$$e^x = \frac{48}{5}$$

$$e^x = 9.6$$

$$x = \ln 9.6$$

$$x \approx 2.26$$

Thus,  $x$  is between 2 and 3.

The correct answer is **b**.

23. Solve the following logarithmic equation.  
Change to Exp. Form.

$$\ln(5x+1) = 1$$

$$e^1 = 5x+1$$

$$\text{or } 5x+1 = e^1$$

$$5x = e - 1$$

$$x = \frac{e-1}{5}$$

The correct answer is **c**.

FREE RESPONSE

24. Match the following graphs with their equations. [ 15 points ]

Equations

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

D.  $y = x^2 - 10x + 25$

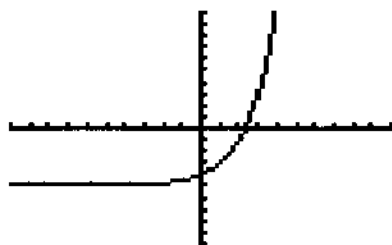
B.  $y = \ln x$

E.  $y = (5)2^x$

C.  $y = 2^x - 5$

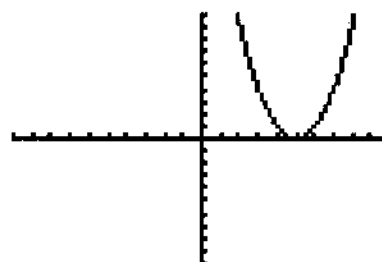
F.  $y = -2x + 5$

I.



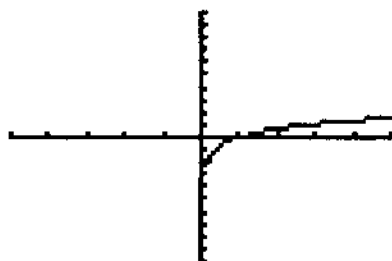
C  $(y = 2^x - 5)$

II.



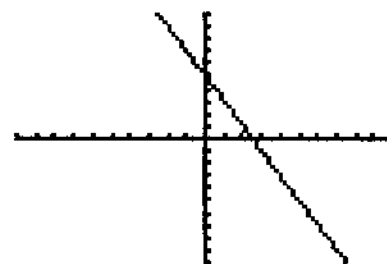
D  $(y = x^2 - 10x + 25)$

III.



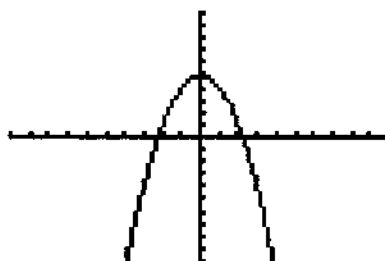
B  $(y = \ln x)$

IV.



F  $(y = -2x + 5)$

V.



A  $y = -x^2 + 5$

25. Define Variables

Let  $x = \#$  of pairs of climbers

$y = \#$  of pairs of jumpers

Define Constraints

Leather  $4x + 6y \leq 450$

Rubber  $5x + 2y \leq 260$

$x \geq 0$

$y \geq 0$

Define Objective Function

Maximize Profit:

$P = 16x + 20y$

$3[5x + 2y = 450] \rightarrow 15x + 6y = 780$

$4x + 6y = 450 \quad -4x + 6y = 450$

$11x = 330$

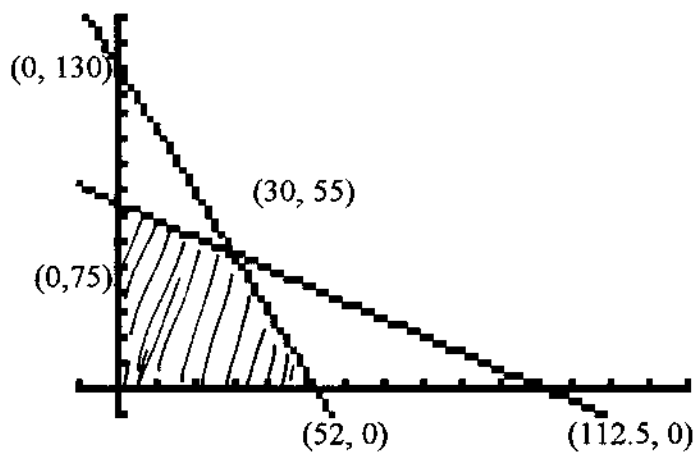
$x = 30$

$4(30) + 6y = 450$

$120 + 6y = 450$

$6y = 330$

$y = 55$



$5x + 2y = 260$

$4x + 6y = 450$

Evaluate Corner Points in Objective Function

Corner Points	Objective Function Maximize $P = 16x + 20y$
(0, 0)	$P = \$0$
(0, 75)	$P = 20(75) = \$1500$
(30, 55)	$P = 16(30) + 20(55) = \$1580$
(52, 0)	$P = 16(52) = \$832$

$\therefore$  The company should manufacture 30 pairs of Climbers and 55 pairs of Jumpers each day to receive a Maximum of profit of \$1580.