# TEST C. QUANTITATIVE

### Section 1. Fundamental Operations.

DIRECTIONS. In each item below, select the correct answer from the given choices.

EXAMPLE:

$$1 + 2 \times 3 =$$

|  |  |  |
|---|---|---|
| A) 5 | C) 7 | E) 9 |
| B) 6 | D) 8 | |

The correct answer is C, noting that multiplication comes before addition in a complex series of operations.

1. $1 - \dfrac{1}{1 - \dfrac{1}{1 - \dfrac{1}{1-a}}} =$

|  |  |
|---|---|
| A) 0 | C) $1 - a$ |
| B) 1 | D) $1 + a$ |

2. $\left[ \left( 5 + 8 \times 9 \div 12 - 3^2 \right) \times \left( 56 \div 14 \times 13 - 261 \div 87 \right)^{\frac{1}{2}} \right] \div 0.5 =$

|  |  |
|---|---|
| A) $-26$ | C) 7 |
| B) $\dfrac{21}{2}$ | D) 28 |

3. $\sqrt{\dfrac{\left(81^{\frac{1}{2}}\right)\left(27^{\frac{1}{2}}\right)}{3\sqrt{3}}} =$

   A) 3          B) 9          C) $\sqrt{3}$          D) 1

4. $(3i - 2)(6i + 4) =$

   A) $-26$                    C) $24i - 26$

   B) $-26i$                   D) $24 - 26i$

5. $\dfrac{2^{n+1} \cdot 128}{2^{n-1} \cdot 4}$

   A) 32                       C) $2^{2n}$

   B) 128                      D) $32^{2n}$

6. $\dfrac{1 - 2i + 3i^2}{1 + 2i - 3i^2} =$

   A) $\dfrac{3}{5} - \dfrac{1}{5}i$          C) $-\dfrac{3}{5} - \dfrac{1}{5}i$

   B) $-\dfrac{3}{5} + \dfrac{1}{5}i$          D) $\dfrac{3}{5} + \dfrac{1}{5}i$

7. $\dfrac{x^3\left(x^{-2}\right)^4\left(x^2\right)^{-3}}{\left(x^{-1}\right)^2\left(x^5\right)^{-1}\left(x^7\right)^{-3}}$

A) $x^{13}$

C) $x^{17}$

B) $\dfrac{1}{x^{15}}$

D) $\dfrac{1}{x^{19}}$

8. Find the sum of the following sequence:

$$66,\ 44,\ 29\tfrac{1}{3},\ 19\tfrac{5}{9},\ ...$$

A) $158\tfrac{8}{9}$

C) 297

B) 198

D) cannot be determined

9. Solve for $x$:   $x^2 + 10x - 5 = 15x - 11$

A) $\{-3, 2\}$

C) $\{2, 3\}$

B) $\{-2, 3\}$

D) $\{-3, -2\}$

10. Which expression has the *greatest* value when $x = -1$ and $y = 2$?

A) $\dfrac{x - y}{xy}$

C) $\dfrac{x^{-1} + y^{-2}}{y^{-1}}$

B) $\dfrac{x + y}{y - 2x}$

D) $\dfrac{2x - y^{-1}}{x^{-2}}$

11. What is the inverse function of $y = \dfrac{x+5}{x}$

    A) $y = \dfrac{x}{x-5}$                C) $y = \dfrac{x+5}{x}$

    B) $y = \dfrac{x}{x+5}$                D) $y = \dfrac{5}{x-1}$

12. Combine into a single expression: $\dfrac{3}{1-x} - \dfrac{3}{x-1} + \dfrac{3}{x+1}$

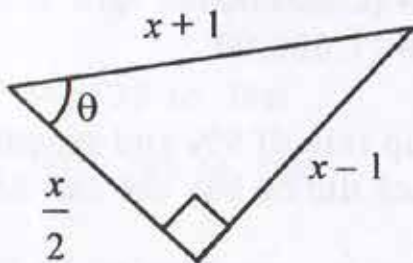    A) $\dfrac{3x-9}{x^2-1}$              C) $\dfrac{9x-3}{1-x^2}$

    B) $\dfrac{6x}{1-x^2}$                D) $\dfrac{9+3x}{1-x^2}$

13. Find the value of $\tan\theta$.



    A) $\dfrac{17}{8}$                C) $\dfrac{13}{5}$

    B) $\dfrac{12}{5}$                D) $\dfrac{15}{8}$

14. Solve for $a$: $\left(16^{a+1}\right)\left(4^a\right)\left(2^{a-1}\right) = \left(2^{2a+1}\right)\left(16^a\right)\left(4^{a-1}\right)$

    A) 1           B) 2           C) 3           D) 4

15. Evaluate $f(2) - f(1) : f(x) = 4x^3 + 2x^2$

    A) 48         B) $-10$        C) 34        D) $-34$

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### Section 2. Word Problems.

DIRECTIONS. Choose the correct answer to each of the questions arising from the problems given in this test.

EXAMPLE:

If the sum of three consecutive even numbers is 12, what is the smallest of the three numbers?

A) 8                    C) 4
B) 6                    D) 2

The correct answer is **D**. Upon solving, it will be seen that the three numbers are 2, 4, and 6, the smallest of which is 2.

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16. Nicky is a cell phone dealer who uses a mark-up rate of 7.5%. If he bought a new model phone for ₱ 12,000.00 from the manufacturer, how much will he sell it?

    A) ₱ 12,750.00              C) ₱ 12,900.00
    B) ₱ 12,800.00              D) ₱ 21,000.00

17. If Pyugs, a car dealer, uses a mark up rate of 9% and recently sold a car for ₱ 899,250.00, how much did he buy the car from the manufacturer?

    A) ₱ 815,000.00             C) ₱ 820,000.00
    B) ₱ 818,317.50             D) ₱ 825,000.00

18. A CD store bought 400 CD's at ₱ 375.00 each. It is estimated that, after a few months, 20% of the CD's may end up being sold at 50% off the selling price that the company decides to use. What should the selling price be if a gross profit of 20% of the cost of the whole CD shipment is desired?

    A) ₱ 425.00                 C) ₱ 475.00
    B) ₱ 450.00                 D) ₱ 500.00

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**For nos. 19 to 20.** A pyramid has a square base. The height of the lateral triangular faces is 10 cm and the side of the square base is 16 cm.

19. What is the volume of the pyramid?

     A) $512 \text{ cm}^3$          C) $2560 \text{ cm}^3$

     B) $160 \text{ cm}^3$          D) $1536 \text{ cm}^3$

20. What is the surface area of the entire solid?

     A) $896 \text{ cm}^2$          C) $800 \text{ cm}^2$

     B) $576 \text{ cm}^2$          D) $512 \text{ cm}^2$

21. Veronica Louise wants to build a fenced, rectangular playground for her children, Lourdes and Rocco. She is going to set up the playground against a pre-existing wall, so she only has to fence in 3 sides. If Veronica managed to create the largest possible area with 108 feet of fencing, what is the area of the pen?

     A) 729 sq. feet          C) 1,458 sq. feet

     B) 1,296 sq. feet          D) 2,916 sq. feet

22. The Justice Troop - a team of superheroes - are searching for supervillains on a remote island in the Pacific. Each hero needs to cover 2,500 sq. meters of desert terrain, 1,250 sq. meters of coastal land, 3,300 sq. meters of flatlands, and 4,100 sq. meters of jungle terrain. If the island is $6.69 \times 10^{-2}$ sq. km, how many members of the Justice Troop are in the search mission?

     A) 4          C) 8

     B) 6          D) 10

23. Ingrid can prick 10 balloons in 10 seconds while Julienne can prick the same number of balloons in 5 seconds. If they work together, how long will it take them to prick 10 balloons?

A) $1\frac{1}{5}$ seconds          C) $4\frac{3}{5}$ seconds

B) $3\frac{1}{3}$ seconds          D) $7\frac{1}{2}$ seconds

24. Density is directly proportional to mass and inversely proportional to volume. What will happen to the value of density when mass is quadrupled and volume is quartered?

A) remains the same      C) it will be multiplied by 16
B) it will be halved         D) it will be doubled

25. Karina bought a piece of land in the shape of a right triangle.

If the area of the lot is 14,400 m$^2$ and one of the legs is 240 m long, what angle does this leg make with the lot's hypotenuse?

A) $(\tan^{-1} \frac{1}{4})^o$          C) $45^o$

B) $(\tan^{-1} \frac{1}{2})^o$          D) $60^o$

26. If Karen, Kaye, and Adel each threw one die simultaneously, what is the probability that the sum of the resulting numbers in the three dice is not 6?

A) $\frac{5}{108}$     B) $\frac{103}{108}$     C) $\frac{1}{216}$     D) $\frac{211}{216}$

27. If $\sqrt[3]{x} + \sqrt[3]{y} = 13$; $\sqrt[3]{x^2} - \sqrt[3]{xy} + \sqrt[3]{y^2} = 43$; and $x - y = -127$, then what are x and y, respectively?

A) 125 and 512      C) 64 and 191
B) 385 and 512      D) 216 and 343

28. A boat traveling upstream can cover 24 km in 2 hours and then go back to its original position in 1.5 hours. Which of the following can be used to solve for the boat's speed in still water, where $1/x$ is the boat's speed and $1/y$ is the speed of the current?

A) $\begin{cases} 24 = \dfrac{\frac{1}{x} - \frac{1}{y}}{2} \\[3ex] 24 = \dfrac{\frac{1}{x} + \frac{1}{y}}{\frac{3}{2}} \end{cases}$

C) $\begin{cases} 24 = \dfrac{1}{x} - \dfrac{1}{y} \\[2ex] 24 = \dfrac{1}{x} + \dfrac{1}{y} \end{cases}$

B) $\begin{cases} 12 = \dfrac{1}{x} - \dfrac{1}{y} \\[2ex] 16 = \dfrac{1}{x} + \dfrac{1}{y} \end{cases}$

D) $\begin{cases} 12 = \dfrac{1}{x} + \dfrac{1}{y} \\[2ex] 16 = \dfrac{1}{x} - \dfrac{1}{y} \end{cases}$

**For nos. 29 to 31.** Knightman is fixing his utility belt. He notices he has some gadgets left to pack: the knightarang, a smoke bomb, venom antidote, a tracer, a lockpick, a hook, and a gas mask. However, he has only 3 compartments left in his belt.

29. How many possible ways can Knightman choose which gadgets he will put into the last 3 compartments?

     A) 21                 C) 210

     B) 35                 D) 840

30. How many possible distinct arrangements can he make with all the gadgets left for the 3 compartments?

     A) 21                 C) 210

     B) 35                 D) 840

31. When he finally chooses which gadgets to pack, how many possible distinct arrangements can he make for these in the compartments left?

A) 6                          C) 27

B) 9                          D) 35

32. What is the equation of the graph?



A) cos $x$                    C) $-$ cos $x$
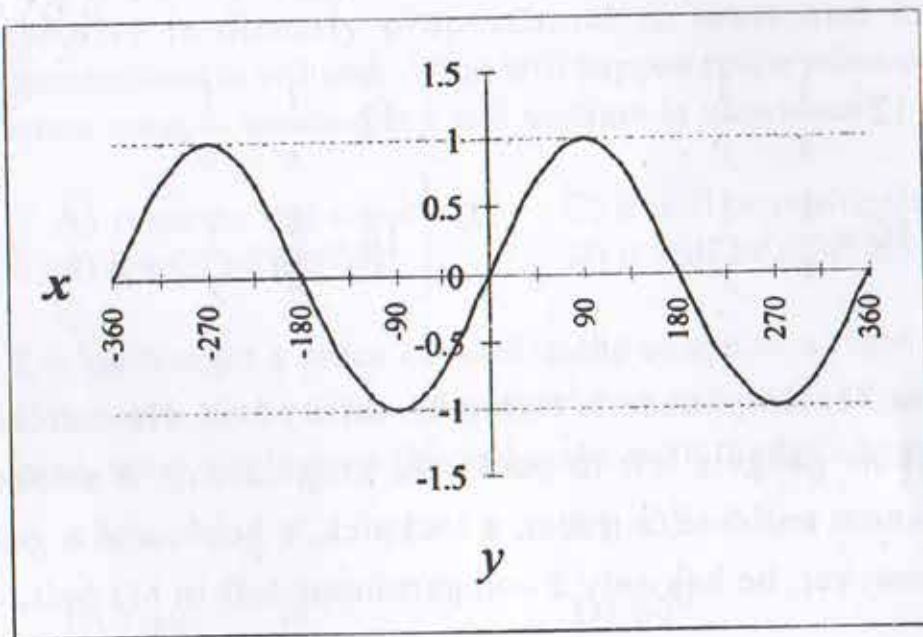
B) sin $x$                    D) $-$ sin $x$

33. An avid fan of classical mythology, Toby bought 6 identical marble statues of the goddess Hera and 3 each of Demeter and Hestia for his garden. How many different, distinguishable ways can he arrange the statues in a row in his garden?

A) 54                         C) 18,480

B) 84                         D) 110,880

34. Cora is 63 years old and Erlinda is 42 years old. How many years ago was Cora two and a half times as old as Erlinda?

   A) 11                    C) 21

   B) 19                    D) 28

35. A tree is $4\sqrt{3}$ m high. The angle of elevation of the top of the tree from person A is 45° while the angle of elevation from person B is 30°. Find the distance between persons A and B.



   A) $12-4\sqrt{3}$            C) $8\sqrt{3}$

   B) $4\sqrt{3}+4$            D) $8-\sqrt{3}$

### Section 3. Data Interpretation.

DIRECTIONS. In this test, sets of data (in graph or chart form) are given. Each set is followed by questions regarding the said data. Select the correct answer from the given options.

A.    The donut charts below show yearly surveys of fans of selected pop bands for the years 1998, 1999, and 2000, with the innermost donut representing 1998 and the outermost representing 2000. Each correspondent was asked to choose one and only one band which they most preferred.

    1998 (innermost donut)       - 4,000 people surveyed
    1999 (middle donut)          - 5,000 people surveyed
    2000 (outermost donut)       - 6,000 people surveyed

**Pop Band Survey**
**1998 - 2000**

15.0%
10.0%          21.0%
3.0%
42.5%    16.0%    5.0%
        20.0%  45.0%    25.0%
        30.0%
50.0%
2.5%
15.0%

☐ Spice Girls  ▨ Backstreet Boys  ▣ Boyzone  ▨ All Saints  ■ Westlife

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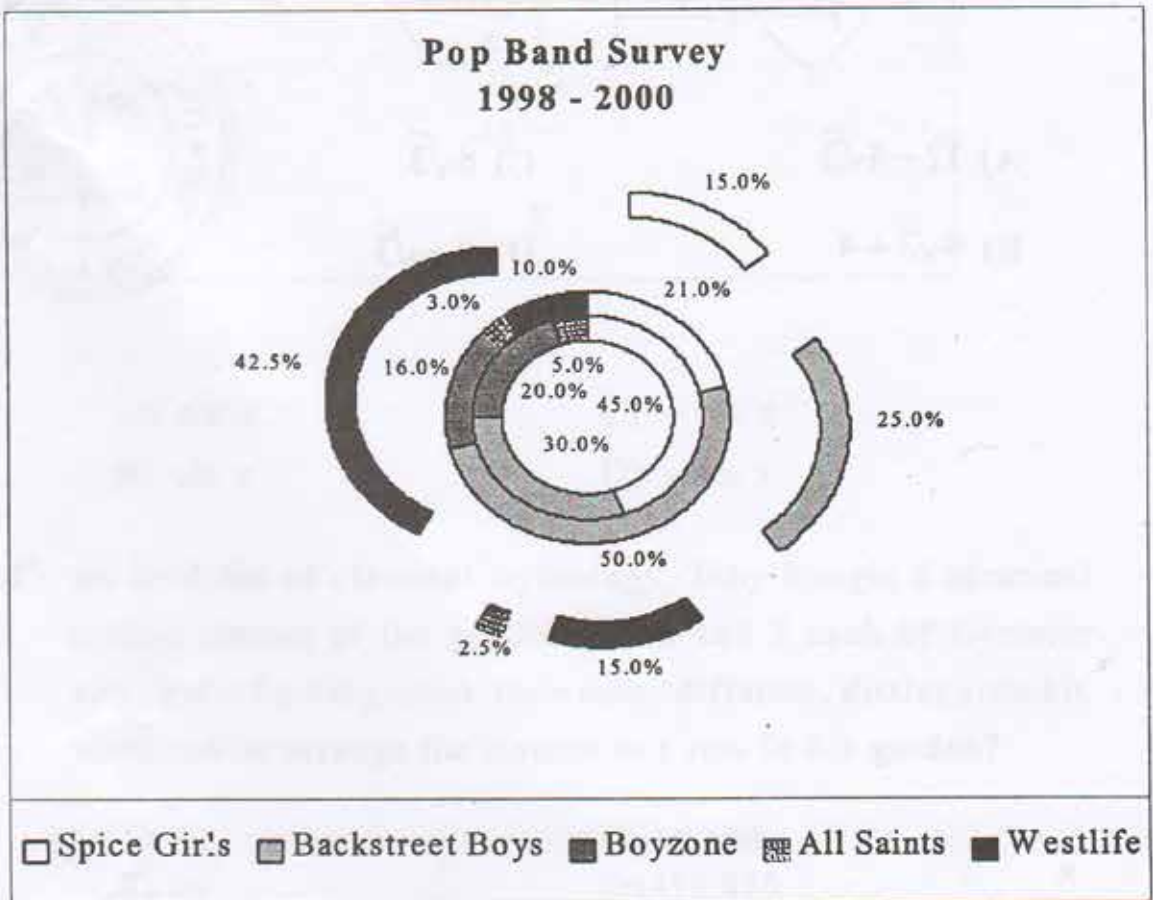
36. In 1999, one band had exactly the same number of fan votes they had the previous year (1998). In 2000, another band also had the same number of fan votes they had the previous year (1999). What are these two groups, respectively?

    A) Spice Girls and          C) Backstreet Boys and Spice
         Backstreet Boys             Girls
    B) Boyzone and All Saints     D) All Saints and Boyzone

37. Which group had the biggest percent decrease in fans between 1999 and 2000?

    A) All Saints               C) Spice Girls
    B) Backstreet Boys       D) Westlife

38. Which group was probably not yet in the industry in 1998?

    A) Westlife                C) Boyzone
    B) Spice Girls            D) All Saints

39. How many more people surveyed were Westlife fans in 2000 than in 1999?

    A) 1,625                C) 2,050
    B) 1,950               D) 2,550

40. If, in 1998, 810 of the Spice Girl fans surveyed were male, what % of everyone surveyed in 1998 were female Spice Girl fans?

    A) 75.25 %            C) 75 %
    B) 55 %               D) 24.75%

B.      To aid the Scholarship Program of their organization, the Executive Council of the UP Association of Biology Majors tasked the various committees to raise funds in any way they could within 2 months. The amount to be raised by each committee depended on the number of people in each committee. After one month, the following graph was posted for the benefit of the members.
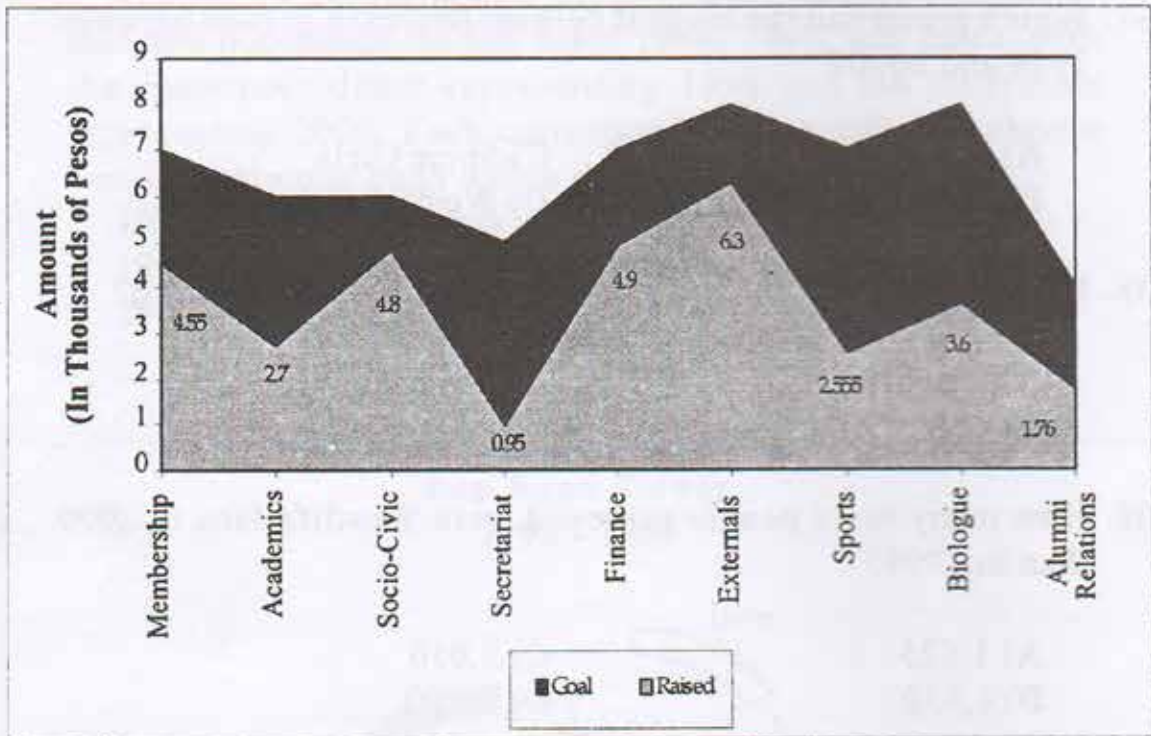


41. Which committee has raised the highest amount of money relative to its goal?

    A) Socio-Civic            C) Finance
    B) Externals             D) Membership

42. About how many percent of the total goal of the entire organization has been raised?

    A) 44.63 %             C) 55.37 %
    B) 53.69 %             D) 46.31 %

43. Which three committees need to raise the greatest net amount of money to reach their goals?

    A) Academics, Biologue, and Externals
    B) Externals, Finance, and Socio-Civic
    C) Alumni Relations, Sports, and Secretariat
    D) Biologue, Sports, and Secretariat

44. The combined amount that the Academics, Alumni Relations, and Membership Committees still need to raise to achieve their goals is equal to

    A) ₱ 7,990.00          C) ₱ 17,000.00
    B) ₱ 9,010.00          D) ₱ 25,885.00

45. The amount of money that the Externals Committee has raised is about how many percent of the money that the Finance Committee has raised?

    A) 77.78%          C) 112.50 %
    B) 88.89 %         D) 128.57 %

C.    The 2 graphs in the following pages show the distribution of graduates in a university over a period of 25 years (divided into 5 periods of 5 years each).

    The distribution of graduates per bracket of colleges and/or course types is the focus. There are 4 brackets considered, namely:

    (1) Science and Engineering
    (2) Business and Economics
    (3) Social Science and Politics
    (4) Masscom/Arts/Literature/Languages

    Separate graphs were created for male and female graduates.

Distribution of Male Graduates per Course
Every 5 Years

| Time Period | Science/Engineering | Social Science/Politics | Business/Economics | Masscom/Arts/Literature/Languages |
|---|---|---|---|---|
| 1976-1980 | 3420 | 892 | 884 | 600 |
| 1981-1985 | 3225 | 812 | 1035 | 763 |
| 1986-1990 | 2775 | 1065 | 1089 | 845 |
| 1991-1995 | 2652 | 852 | 1316 | 792 |
| 1996-2000 | 2850 | 1338 | 1306 | 714 |

Number of Male Graduates: 100%, 90%, 80%, 70%, 60%, 50%, 40%, 30%, 20%, 10%, 0%

■ Science/Engineering
☒ Business/Economics
▦ Social Science/Politics
□ Masscom/Arts/Literature/Languages

Distribution of Female Graduates per Course Every 5 Years

| Time Period | Business/Economics | Masscom/Arts/Literature/Languages | Science/Engineering | Social Science/Politics |
|---|---|---|---|---|
| 1976-1980 | 650 | 816 | 223 | 855 |
| 1981-1985 | 637 | 1265 | 638 | 1075 |
| 1986-1990 | 780 | 891 | 710 | 1850 |
| 1991-1995 | 968 | 1484 | 923 | 2548 |
| 1996-2000 | 1326 | 1959 | 892 | 1900 |

Oberon Overseas
education & migration

46. What percent of all graduates of the university from 1976-2000 came from the decade of the 1990's?

    A) 23.80%                          C) 22.35%
    B) 46.15%                          D) 40.44%

47. Compared to the time period 1991-2000, by how many percent did the number of female Science/Engineering graduates increase from the time period 1976-1990?

    A) 17.67%                          C) 84.98%
    B) 15.02%                          D) 32.66%

48. During the 1980's, what percent of all the graduates then were either Business/Economics majors or Social Science/Politics majors?

    A) 14.54%                          C) 36.81%
    B) 38.58%                          D) 39.50%

49. All in all, how many more female Social Science/Politics graduates are there than male Masscom/Arts/Literature/ Languages graduates?

    A) 2,054                           C) 2,701
    B) 785                             D) 1,269

50. The combined number of male graduates of Science/ Engineering and Business/Economics in the 1980's decreased by how many graduates in the 1990's?

    A) 498                             C) 7,435
    B) 185                             D) 4,123