BARTON COLLEGE
PRACTICE PLACEMENT TEST

1. Simplify: $20 + 4^3 \div (-8)$

a) 4 b) -4 c) 12 d) -10.5

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2. Simplify: (2a – 4) + 2(a – 5) – 3(a+1)

a) 7a – 11 b) a – 17 c) a – 11 d) 7a -17

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3. Evaluate the expression: $4a^2 - 4ab + b^2$, when a = 2 and b = 5

a) -14 b) 1 c) 66 d) 81

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4. Firefighters use the formula S = 0.5P + 26 to compute the horizontal range S in feet of water from a particular hose, where P is the nozzle pressure in pounds. Find the horizontal range if pressure is 90 lb.

a) 44 feet b) 450 feet c) 19 feet d) 71 feet

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5. Simplify: $2x^2\left(-3x^2\right)^3$

a) $54x^{12}$ b) $18x^8$ c) $-18x^{12}$ d) $-54x^8$

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6. Simplify: $\left(\frac{2u^{-5}v^2}{8w}\right)^{-2}$

a) $\frac{w^2v^4}{4u^7}$ b) $\frac{16v^4}{w^2u^{10}}$ c) $\frac{16w^2u^{10}}{v^4}$ d) $\frac{u^7v^4}{4w^2}$

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7. Express in scientific notation: 0. 0000056

a) 5.6×10^{-6} b) 5.6×10^{6} c) 5.6×10^{-5} d) 5.6×10^{-7}

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8. Expand: 1.20×10^5

a) 12000000 b) 1200000 c) 120000 d) 12000

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9. Solve: $\frac{1}{4}x - \frac{5}{8} = \frac{3}{8}$

a) x = 4 b) x = 2 c) x= $\frac{1}{2}$ d) x = $\frac{1}{4}$

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10. Solve: 8(x – 2) – 5(x + 4) = 20 + x

a) x = 9 b) x = 28 c) x = -8 d) x = -18

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11. Solve for *m*: $F = \frac{mv^2}{r}$

a) $m = \frac{F}{rv^2}$ b) $m = Frv^2$ c) $m = \frac{Fv^2}{r}$ d) $m = \frac{Fr}{v^2}$

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12. Solve P: $A = P + \mathrm{Pr}t$

a) $P = A - rt$ b) $P = \frac{A - rt}{2}$ c) $P = \frac{A}{1 + rt}$ d) $P = \frac{A}{2rt}$

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13. Solve: $\frac{6}{x-5} = \frac{4}{x}$

a) x = -5 b) x = -6 c) x = -10 d) x = 2

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14. Solve: $2|x-3| = 5$

a) x = 4, 0 b) $x = \frac{1}{2}, \frac{11}{2}$ c) x = 0, $\frac{11}{2}$ d) $x = -\frac{1}{2}, -\frac{11}{2}$

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15. Solve: $3 - \frac{x}{x-4} = \frac{4}{4-x}$

a) x = 4 b) x = -4 c) x = 1 d) No solution

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16. Simplify: $\frac{x^3 + x^2y - 6xy^2}{x^2 - 2xy}$

a) x – 2y b) x(x + 3y) c) x(x-2y) d) x + 3y

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17. Simplify: $\frac{4x^2-1}{2x^2+5x-3}$

a) Cannot be simplified b) $\frac{2x-1}{x+3}$ c) $\frac{2x+1}{x-3}$ d) $\frac{2x+1}{x+3}$

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18. Solve: $-3(2x-3) \le 27$

a) $x \le -6$ b) $x \ge -6$ c) $x \ge -3$ d) $x \le -3$

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19. Solve: $\frac{2}{3}+\frac{x}{5}<\frac{4}{15}$

a) $x > 2$ b) $x > -2$ c) $x < -2$ d) $x < 2$

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20. John averaged 82 out of 100 on his first three tests. What was John's score on the fourth test if his average after the fourth test dropped to 79 out of 100?

a) Cannot be found b) 80 c) 75 d) 70

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21. The sales tax rate in Wilson County is 6.75%. Suppose total price of an item that you bought in Wilson County including taxes is $14.93, what is the price (rounded to two decimal places) before tax?

a) $12.93 b) $13.99 c) $15.94 d) $8.91

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22. The long term parking rate at Raleigh-Durham Airport is $2 per hour (or part of an hour) with $10 daily maximum (12:00 a.m. to 12:00 a.m.). Suppose you park your car on Friday afternoon at 8:30 p.m. and pick it up on the following Tuesday at 9:30 a.m., what will be you parking fee?

a) $58 b) $ 50 c) $ 48 d) $ 38

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23. Solve: $2x(10x + 8) = -3(x+1)$

a) $x=\frac{3}{4},\frac{1}{5}$ b) $x=-\frac{3}{4},\frac{1}{5}$ c) $x=-\frac{3}{4},-\frac{1}{5}$ d) $x=\frac{3}{4},-\frac{1}{5}$

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24. Solve: $(2x-3)^2-8=0$

a) $x = \frac{3\pm 2\sqrt{2}}{2}$ b) x = 3, -2 c) $x=-3\pm 2\sqrt{2}$ d) $x = \frac{-3\pm 2\sqrt{2}}{2}$

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25. The profit, *P*, realized by a company varies directly as the number of products *s* it sells. If a company makes a profit of $7800 on the sale of 325 products, what is the profit when the company sells 5000 products?

a)$120,000 b) $100,000 c) $80,000 d) $60,000

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26. If the voltage, V, in an electric circuit is held constant, the current I, is inversely proportional to the resistance, R. If current is 120mA (milliampere) when resistance is 5 ohms, find the current when the resistance is 15 ohms.

a) 40mA b) 357mA c) 360mA d) 200mA

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27. A 36 foot long tube is cut into two pieces with ratio 4:5. Find the length of the shorter piece.

a) 9 feet b) 16 feet c) 12 feet d) 20 feet

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28. A large square pizza has 49 pieces (square slices). John, Jack and Jane ate all the pieces in the ratio 4:2:1 respectively. How many pieces did Jack eat?

a) 10 pieces b) 12 pieces c) 14 pieces d) 18 pieces

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29. Solve: $\sqrt{1-2x}+1=3$

a) x = 0 b) $x=-\frac{3}{2}$ c) x = -1 d) $x=\frac{1}{2}$

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30. Solve for *V* given $r=\sqrt{\frac{V}{\pi h}}$

a) $V=\sqrt{\frac{r}{\pi h}}$ b) $V=\frac{\pi h}{r^2}$ c) $V=\pi h r^2$ d) $V=r\sqrt{\pi h}$

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31. Find the equation of the straight line passing through the points (2,-4) and (1,0).

a) y = - 4x + 4 b) y = 4x – 4 c) y = 4x + 4 d) y = -4x - 4

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32. Determine the x and y intercepts of the graph of 7x – 5y = 35

a) (5, 0) and (0, -7) b) (-5, 0) and (0, 7) c) (-5, 0) and (0, -7) d) (5, 0) and (0, 7)

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33. The linear relationship between the Fahrenheit scale and Centigrade scale for temperatures is given by $F = \frac{9}{5}C + 32$. Which of the following statements, if any, are **TRUE?**

A. 68 ° F corresponds to 20° C B. 40 ° C corresponds to 78° F

a) Only A b) Only B c) Both A and B d) Neither A nor B

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34. John (J) is 5 years older than his sister Mary (M) who is 2 years younger than her brother Paul (P). If J, M and P denote their ages, which one of the following represents the given information?

a) $\begin{cases} J = M + 5 \\ P = M - 2 \end{cases}$ b) $\begin{cases} J = M + 5 \\ M = P + 2 \end{cases}$ c) $\begin{cases} M = J + 5 \\ P = M - 2 \end{cases}$ d) $\begin{cases} J = M + 5 \\ M = P - 2 \end{cases}$

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35. Solve the system: $\begin{cases} 3x - 5y = -4 \\ 3x - y = 4 \end{cases}$

a) (-2, -10) b) (2, 2) c) $\left(2, -\frac{2}{5}\right)$ d) $\left(\frac{4}{3}, 0\right)$

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36. The sum of two numbers is 31. Twice the smaller number is 11 more than the larger number. The positive difference between the numbers is

a) 4 b) 3 c) 2 d) 1

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37. Find the coordinates of a point A whose distance from the origin (0, 0) is 5 units.

a) A (3, 3) b) A(-3, 2) c) A(4, -3) d) A(1, 4)

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38. Consider the circle given by the equation $(x - 2)^2 + (y + 1)^2 = 5$. Find the center and radius.

a) (-2, 1); 5 b) (2, -1); 5 c) (2, -1); $\sqrt{5}$ d) (-2, 1); $\sqrt{5}$

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39. The inequality $|8 - x| < 8$ is equivalent to

a) $x < 0$ b) $x > 0$ c) $x < 0$ or $x > 16$ d) $0 < x < 16$

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40. The inequality $|x+4| \geq 1$ is equivalent to

a) $x \geq -5$ b) $x \geq -3$ or $x \leq -5$ c) $x \leq -5$ d) $-5 \leq x \leq -3$

41. The interval solution to the inequality $\frac{x-2}{x+1} > 0$ is

a) $(2, +\infty)$ b) $(-\infty, 2)$ c) $(-\infty, -1) \cup (2, +\infty)$ d) $(-1, 2)$

42. Let $f(x) = \sqrt{1-2x}$. Find $f(a-1)$

a) $\sqrt{1-2a}-1$ b) $\sqrt{1-2a}$ c) $\sqrt{3-2a}$ d) $\sqrt{-2a}$

43. Let $f(x) = 2 - x^2$ and $g(x) = 2x - 1$. Which of the following, if any, is **false**?

a) $(f+g)(0) = -2$ b) $(f-g)(1) = 0$ c) $(fg)(2) = -6$ d) $\left(\frac{f}{g}\right)(1) = 1$

44. Let $f(x) = 2 - x^2$ and $g(x) = 2x - 1$. Which of the following, if any, is **true**?

a) $(f \circ g)(0) = -2$ b) $(g \circ f)(0) = 3$
c) $(f \circ f)(x) = 4 - 4x^2 + x^4$ d) $(g \circ g)(x) = 4x^2 - 4x + 1$

45. Let $f(x) = 3 - 2x$. Find the difference quotient $\frac{f(x+h) - f(x)}{h}$

a) 1 b) 2h c) $\frac{h-4x}{h}$ d) -2

46. Consider the quadratic function $f(x) = 2x^2 - 4x + 1$. Find the vertex of the graph of $f(x)$.

a) (-2, 1) b) (2, 1) c) (1, -1) d) (-1, 7)

47. The temperature, in degrees Fahrenheit, over a twelve hour period is given by the function $T(t) = -0.5t^2 + 6t + 30$, where t = 0 denotes 6:00 a.m. When is the morning temperature 47.5° F?

a) 12 noon b) 11:00 a.m. c) 10 a.m. d) 9:00 a.m.

48. Simplify and express in the form **a + bi**: (-2 + i)(3 + 2i)

a) -8 + 0i b) -8 + 2i c) -8 – i d) -6 + 2i

49. Simplify and express in the form **a + bi**: $\frac{-4i}{1+i}$

a) 2 – 2i b) -2 – 2i c) 4 – 4i d) -4 + 4i

50. Find the domain of the function $f(x) = \frac{x+3}{x^2+1}$.

a) all real numbers b) $x \neq 1, -1$ c) $x \neq -3$ d) $x \neq -3, -1, 1$

51. Find the equation of horizontal asymptote of the function $f(x) = \frac{x+3}{x^2-1}$

a) y = 1 b)y = -1 c) y= 3 d) y = 0

52. Find the inverse function for f(x) = $\frac{x}{3} - 2$.

a) $f^{-1}(x) = 6x + 3$ b) $f^{-1}(x) = 3x + 2$ c) $f^{-1}(x) = 2x + 3$ d) $f^{-1}(x) = 3x + 6$

53. Which of the following pairs of exponential and logarithmic forms is **false**?

a) $3^{-2} = 1/9$; $\log_3(1/9) = -2$ b) $(1/2)^{-2} = 4$; $\log_4(1/2) = -2$

c) $10^3 = 1000$; $\log(1000) = 3$ d) $e^2 = x$; $\ln(x) = 2$

54. Write in terms of log(x), log(y), log(z): $\log\left(\frac{y\sqrt{z}}{x^2}\right)$

a) log(y) – 0.5 log(z) – 2 log(x) b) log(y) + 0.5 log(z) – 2log(x)

c) log(y) + 0.5 log(z) + 2log(x) d) log(y) + 0.5log(z) + 2log(x)

55. Find the hydronium-ion concentration, H^+, of a solution given pH = 7.1 Note: $pH = -\log(H^+)$

a) 7.9×10^{-8} moles per liter b) 7.1×10^{-9} moles per liter
c) 8.3×10^{-4} moles per liter d) 1.3×10^{7} moles per liter

56. Solve: $e^{2x-1} = 32$

a) $x = \dfrac{1+\ln(32)}{2}$ b) $x = \dfrac{1-\ln(32)}{2}$ c) $x = 1+\ln(16)$ d) $x = \dfrac{1}{2}+\ln(16)$

57. Solve the equation: $\log_2(x+1) - \log_2(x-1) = 2$

a) x = 3 b) x = 5 c) x = 5/3 d) x = 0

58. Suppose the population of a town is given by the model $P(t) = 17250\left(\dfrac{1}{2}\right)^{t/10}$, where t denotes the number years since 2000. Which of the following statements is **true**?

a) The population in 2000 was 8625.
b) The population doubles every 10 years.
c) The population is halved every ten years
d) The population is growing by 50% every ten years.

59. If the angle $\theta = \dfrac{3\pi}{5}$ radians, then

a) $0 < \theta < 90^\circ$ b) $90^\circ < \theta < 180^\circ$ c) $180^\circ < \theta < 270^\circ$ d) $270^\circ < \theta < 360^\circ$

60. If the light beam makes one complete revolution every 20 seconds, how long will it take to sweep and angle of 150°?

a) less than 3 seconds b) between 3 and 5 seconds
c) between 5 and 7 seconds d) between 7 and 10 seconds

61. Given an isosceles triangle with base length 32 cm and altitude 12 cm, find the length of the congruent sides.

a) 24 cm b) 22 cm c) 20 cm d) 18 cm

62. If $\tan\theta = 3$ and $\sin\theta > 0$, then $\cos\theta$ equals

a) $-\frac{3}{\sqrt{10}}$ b) $\frac{3}{\sqrt{10}}$ c) $\frac{1}{\sqrt{10}}$ d) $-\frac{1}{\sqrt{10}}$

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63. If $\csc\theta = \frac{13}{5}$ and $\cos\theta < 0$, then $\cot\theta$ equals

a) $\frac{12}{5}$ b) $-\frac{12}{5}$ c) $\frac{5}{12}$ d) $-\frac{13}{12}$

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64. Find the exact value of $\csc\left(225^\circ\right)$

a) $-\sqrt{2}$ b) $-\frac{\sqrt{2}}{2}$ c) $\sqrt{2}$ d) $\frac{\sqrt{2}}{2}$

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65. Find the exact value of $\cot\left(420^\circ\right)$

a) $\frac{\sqrt{3}}{2}$ b) $\frac{\sqrt{3}}{3}$ c) $\sqrt{3}$ d) $\frac{1}{2}$

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66. If the angle θ in standard position meets the unit circle at $\left(\sqrt{\frac{5}{6}}, -\sqrt{\frac{1}{6}}\right)$, find the value of the functions $\sin\left(\theta\right)$ and $\cos\left(\theta\right)$.

a) $\sin\theta = \sqrt{\frac{5}{6}}$ and $\cos\theta = -\sqrt{\frac{1}{6}}$ b) $\sin\theta = -\sqrt{\frac{1}{6}}$ and $\cos\theta = \sqrt{\frac{5}{6}}$

c) $\sin\theta = -\sqrt{\frac{5}{6}}$ and $\cos\theta = \sqrt{\frac{1}{6}}$ d) $\sin\theta = \sqrt{\frac{1}{6}}$ and $\cos\theta = -\sqrt{\frac{5}{6}}$

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67. Find the expression that is equal to $\frac{1+\sin\theta}{1-\sin\theta}$

a) $\sin\theta + \cos^2\theta$ b) $\dfrac{\csc\theta + 1}{\csc\theta - 1}$ c) 0 d) $\sec^2\theta + \tan^2\theta$

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68. Find the expression that is equal to $(\tan\theta + \cot\theta)^2$

a) $\tan^2\theta + \cot^2\theta$ b) $2\tan\theta\cot\theta$ c) $2\cot^2\theta - 1$ d) $\sec^2\theta + \csc^2\theta$

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69. The minute hand of a clock is 6cm long. How far does the tip of the minute hand travel in 15 minutes?

a) 12π cm b) 9π cm c) 6π cm d) 3π cm

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70. Find the area of a sector of a circle with central angle θ= 3 radians, if the radius of the circle is 6 in.

a) 54 in^2 b) 36 in^2 c) 27 in^2 d) 18 in^2

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71. The area of the sector of a circle with central angle of □ = 2 radians is 16m^2. Find the radius of the circle.

a) 16m b) 8m c) 4m d) 2m

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72. Solve $4\cos\theta + 6 = 5(\cos\theta + 1), 0 \le \theta < 360^\circ$

a) 0° b) 90° c) 180° d) 270°

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73. Solve $(2\sin\theta - 3)(\cos\theta + 2) = 0, 0 \le \theta \le \pi$

a) No solution b) $\theta = \dfrac{\pi}{3}, 0$ c) $\theta = 0, \dfrac{\pi}{2}$ d) $\theta = \dfrac{\pi}{3}, \dfrac{\pi}{2}$

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74. Solve $2\sin^2\theta = \sin\theta + 1, -\dfrac{\pi}{2} \le \theta \le \dfrac{\pi}{2}$

a) $\theta = -\dfrac{\pi}{6}, \dfrac{\pi}{2}$ b) $\theta = \dfrac{\pi}{3}, -\dfrac{\pi}{2}$ c) $\theta = \dfrac{\pi}{6}, -\dfrac{\pi}{2}$ d) $\theta = -\dfrac{\pi}{3}, \dfrac{\pi}{2}$

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75. In a right triangle ABC with m $\angle C = 90^\circ$, if AC = 12 and $\sin(B) = \dfrac{3}{5}$, find AB.

a) 20 b) 6 c) $2\sqrt{14}$ d) 8

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76. In triangle ABC with m $\angle A = 30^\circ$, m $\angle B = 45^\circ$ and BC = $\sqrt{2}$, find AC.

a) $\sqrt{2}$ b) 2 c) 3 d) insufficient information

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77. In triangle ABC with m $\angle A = 30^\circ$, m $\angle B = 60^\circ$ and AB = 12, find BC.

a) $6\sqrt{3}$ b) 6 c) $12\sqrt{3}$ d) insufficient information

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78. Eliminate the parameter ***t*** in the given parametric equation $\begin{cases} x = \cos(t) \\ y = 3 + \sin(t) \end{cases}$

a) $y = 3 + \sqrt{x}$ b) $x = 3 + \sqrt{y}$ c) $x^2 + y^2 = 9$ d) $x^2 + (y-3)^2 = 1$

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79. Eliminate the parameter ***t*** in the given parametric equation $\begin{cases} x = \sin(t)\cos(t) \\ y = \sin(2t) \end{cases}$

a) x = 2y b) y = 2x c) xy = 2 d) $xy = \frac{1}{2}$

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80. Given vectors $\vec{u} = \langle -4, -3 \rangle$ and $\vec{v} = \langle 2, 1 \rangle$, which if the following statements, if any, is **false**.

a) $\left| \vec{u} \right| = 5$ b) $\vec{u} + 2\vec{v} = \vec{0}$ c) $\vec{v} - \vec{u} = \langle 6, 4 \rangle$ d) None of these

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ANSWER KEY

1.	c	21.	b	41.	c	61.	c
2.	b	22.	c	42.	c	62.	c
3.	b	23.	c	43.	a	63.	b
4.	d	24.	a	44.	b	64.	a
5.	d	25.	a	45.	d	65.	b
6.	c	26.	a	46.	c	66.	b
7.	a	27.	b	47.	b	67.	b
8.	c	28.	c	48.	c	68.	d
9.	a	29.	b	49.	b	69.	d
10.	b	30.	c	50.	a	70.	a
11.	d	31.	a	51.	d	71.	c
12.	c	32.	a	52.	d	72.	a
13.	c	33.	a	53.	b	73.	a
14.	b	34.	d	54.	b	74.	a
15.	d	35.	b	55.	a	75.	a
16.	d	36.	b	56.	a	76.	b
17.	d	37.	c	57.	c	77.	b
18.	c	38.	c	58.	c	78.	d
19.	c	39.	d	59.	b	79.	b
20.	d	40.	b	60.	d	80.	b.