

stress test

1. $8^{2x+1} = \left(\frac{1}{2}\right)^{3-2x}$ 이 ¼ ẽ , x ì ê° ì êµ¬í ì ñ ¼.
[배점 2, 하중]

▶ 답:

▶ 정답: $-\frac{3}{2}$

해설

$$\begin{aligned} (2^3)^{2x+1} &= (2^{-1})^{3-2x} \\ 6x+3 &= -3+2x \\ 4x &= -6 \\ \therefore x &= -\frac{3}{2} \end{aligned}$$

2. $3x^4y \div (-3x^2y^3) \times 2x^2y^4$ ì ê° ẽ "í í ẽ©' ?
[배점 2, 하중]

- ① $-2x^4y^2$ ② $-\frac{1}{2y^6}$ ③ $2x^4y^6$
④ $-18x^4y^{12}$ ⑤ $9xy^2$

해설

$$\begin{aligned} 3x^4y \div (-3x^2y^3) \times 2x^2y^4 \\ = 3x^4y \times \frac{1}{-3x^2y^3} \times 2x^2y^4 \\ = -2x^4y^2 \end{aligned}$$

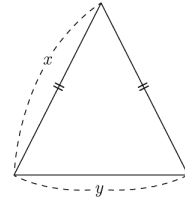
3. $\frac{6x-3y}{2} - \frac{x+4y}{3} - \frac{4x-5y}{6}$ ẽ¥¼ ê° ẽ "í í ẽ©' ?
[배점 2, 하중]

- ① $2x+2y$ ② $2x-2y$ ③ $x+y$
④ $x+2y$ ⑤ $2x+y$

해설

$$\begin{aligned} (\text{ì ¤ ì}) &= \frac{3(6x-3y) - 2(x+4y) - (4x-5y)}{6} \\ &= \frac{12x-12y - 2x-8y - 4x+5y}{6} = 2x-2y \end{aligned}$$

4. ê¸,ì 'ê° 16 ì¸, ẽ ì ¼êì ẽ ¤ì ê¸,ẽì¼ê³¼ ê° ì ì 'ẽ ±ẽ³ ì ¼ê° í ì ẽ§ ẽ ¤ì ẽ ¤. y ẽ¥¼ x ì ê' í ì ì ¼êì ẽ í ẽ 'ì 'ẽ ¼.



[배점 2, 하중]

▶ 답:

▶ 정답: $y = -2x + 16$

해설

ì 'ẽ ±ẽ³ ì ¼ê° í ì ẽ ẽ³ ì ê¸,ì 'ê° ê° ì ¼ê³ ẽì
 $x+x+y=16$, ì| $2x+y=16$ ì 'ẽ ¤.
 $2x$ ẽ¥¼ ì °ẽ³ ì ¼êì ì êê¸,°ê©' $y = -2x+16$ ì 'ẽ ¤.

5. $(2ab^2)^2 \times \left(\frac{a^2}{2b^3}\right)^4 \times \left(\frac{2b^4}{a^5}\right)^2$ ì ê° ë ¨í í ë©' ?
[배점 3, 하상]

- ① 1 ② a ③ b ④ $\frac{b}{a}$ ⑤ $\frac{1}{b}$

해설

$$\begin{aligned} & (2ab^2)^2 \times \left(\frac{a^2}{2b^3}\right)^4 \times \left(\frac{2b^4}{a^5}\right)^2 \\ &= 4a^2b^4 \times \frac{a^8}{16b^{12}} \times \frac{4b^8}{a^{10}} = a^0b^0 = 1 \end{aligned}$$

6. ì ¨ë ¢ ì ì ì $-2x^2 - 2$ ë¥¼ ì í ¨¼ í ê² ì
ë° ë ë ë ì ì ¨ 5x² + 4 ê° ë ì ë ¢. ì³ê² ê³ ì ¨í ì ì
êµ-í ë©' ?
[배점 3, 하상]

- ① x^2 ② $x^2 - 6x$
③ $x^2 - 6x + 4$ ④ $3x^2 - 3x + 2$
⑤ $3x^2 - x + 4$

해설

$$\begin{aligned} & \text{ì ¨ë ¢ ì ì ì } A \text{ ë¼ í ë©' } \\ & A - (-2x^2 - 2) = 5x^2 + 4 \\ & A = (5x^2 + 4) + (-2x^2 - 2) = 3x^2 + 2 \\ & \text{ë° ë¼ì ë° ë¥'ê² ê³ ì ¨í ë©' } (3x^2 + 2) + (-2x^2 - 2) = x^2 \end{aligned}$$

7. $(x-2)(x+2)(x^2+4)$ ë¥¼ ì ê° í ë©' ?
[배점 3, 하상]

- ① $x^2 - 4$ ② $x^2 - 16$ ③ $x^4 - 4$
④ $x^4 - 8$ ⑤ $x^4 - 16$

해설

$$\begin{aligned} & (x^2 - 4)(x^2 + 4) \\ &= x^4 - 16 \end{aligned}$$

8. $(2x+1)(5x+A) = 10x^2 + Bx - 2$ ì¼ ë , $A+B$ ì
ê° ì ?
[배점 3, 하상]

- ① -10 ② -5 ③ -1
④ 1 ⑤ 5

해설

$$\begin{aligned} & (2x+1)(5x+A) = 10x^2 + Bx - 2 \text{ ì } A \times 1 = -2, \\ & \text{ë° ë¼ì } A = -2, B = 2A + 5 = 1 \text{ ì ¨ë ¢.} \\ & \therefore A + B = -1 \end{aligned}$$

9. ë° ë©'ì ë ì ê° $3xy$ ì , ì§ ì ë©'ì² ì ë¼ í¼ê°
 $9x^2y - 6xy^3$ ì¼ ë , ì§ ì ë©'ì² ì ë ì ¨ë¥¼
êµ-í ë©' ?
[배점 3, 하상]

- ① $x - y^2$ ② $2x - y^2$ ③ $3x - y^2$
④ $3x - 2y^2$ ⑤ $2x - 3y^2$

해설

$$9x^2y - 6xy^3 = 3xy \times A$$

$$a = \frac{9x^2y - 6xy^3}{3xy} = 3x - 2y^2$$

10. $(-3x^3)^2 = -3x^5$ $(-2^2x^4y)^3 = 32x^7y^3$ $(2a^2)^4 = 16a^6$ $\left(-\frac{a^2}{b^4}\right)^2 = \frac{a^4}{b^8}$ $\left(-\frac{3y^2}{x}\right)^3 = -\frac{27y^5}{x^4}$ [배점 3, 중하]

① $(-3x^3)^2 = -3x^5$

② $(-2^2x^4y)^3 = 32x^7y^3$

③ $(2a^2)^4 = 16a^6$

④ $\left(-\frac{a^2}{b^4}\right)^2 = \frac{a^4}{b^8}$

⑤ $\left(-\frac{3y^2}{x}\right)^3 = -\frac{27y^5}{x^4}$

해설

① $(-3x^3)^2 = (-3)^2x^6 = 9x^6$

② $(-2^2x^4y)^3 = (-2^2)^3x^{12}y^3 = -64x^{12}y^3$

③ $(2a^2)^4 = 16a^8$

④ $\left(-\frac{a^2}{b^4}\right)^2 = \frac{a^4}{b^8}$

⑤ $\left(-\frac{3y^2}{x}\right)^3 = -\frac{27y^6}{x^3}$

11. $(-3x^{\square}y^2)^3 = -27x^{12}y^{\square}$ [배점 3, 중하]

▶ 답 :

▶ 답 :

▷ 정답 : 4

▷ 정답 : 6

해설

$$x^3 \times \square = x^{12}$$

$$\therefore \square = 4$$

$$y^{2 \times 3} = y^{\square}$$

$$\therefore \square = 6$$

12. $(-2xy^2) \times (3x)^2 \div (6y)^2 = -\frac{x^3}{2}$ $14a^2 \div (-2b^2)^2 \times (2ab^2)^2 = 14a^4$ $\left(\frac{2}{3}a^2\right)^2 \times (3b^2)^2 \div (4ab^2)^2 = \frac{a^2}{4}$ $(10a)^2 \times (-ab^2)^2 \div \left(-\frac{1}{3}ab^2\right)^2 = 25a^2$ $(-4x^2y) \div \left(-\frac{2}{3}y^2\right) \times (2xy^2)^3 = 48x^5y^5$ [배점 3, 중하]

① $(-2xy^2) \times (3x)^2 \div (6y)^2 = -\frac{x^3}{2}$

② $14a^2 \div (-2b^2)^2 \times (2ab^2)^2 = 14a^4$

③ $\left(\frac{2}{3}a^2\right)^2 \times (3b^2)^2 \div (4ab^2)^2 = \frac{a^2}{4}$

④ $(10a)^2 \times (-ab^2)^2 \div \left(-\frac{1}{3}ab^2\right)^2 = 25a^2$

⑤ $(-4x^2y) \div \left(-\frac{2}{3}y^2\right) \times (2xy^2)^3 = 48x^5y^5$

15. ì ì ë ñ ì 'ê° ê° ì ¥ ê° ë ~í ì ì
êµ¬í ì -ë ¼.
 $x + 4y - \{2x - (3y - \square + y) + y\} = 5x - (3x + 2y)$
[배점 3, 중하]

▶ 답:

▷ 정답 : $-3x + 9y$

해설

$$\begin{aligned} & x + 4y - \{2x - (3y - \boxed{} + y) + y\} \\ &= x + 4y - (2x - 3y + \boxed{} - y + y) \\ &= x + 4y - (2x - 3y + \boxed{}) \\ &= -x + 7y - \boxed{} \\ &-x + 7y - \boxed{} = 5x - 3x - 2y = 2x - 2y \\ \therefore \boxed{} &= -x + 7y - 2x + 2y = -3x + 9y \end{aligned}$$

16. $\frac{3}{4}xy\left(-\frac{5}{3}x+\frac{1}{6}y-\frac{1}{3}\right)$ 의 편도함수 $\frac{\partial}{\partial x}$, $\frac{\partial}{\partial y}$ 를 구하고, $\frac{\partial^2}{\partial x^2}$, $\frac{\partial^2}{\partial x \partial y}$, $\frac{\partial^2}{\partial y^2}$ 를 구하여라.

- ① $\frac{15}{8}$ ② $\frac{11}{8}$ ③ 11 ④ 15 ⑤ $\frac{1}{8}$

해설

$$\begin{aligned} & \frac{3}{4}xy \times \left(-\frac{5}{3}x\right) + \frac{3}{4}xy \times \frac{1}{6}y + \frac{3}{4}xy \times \left(-\frac{1}{3}\right) = \\ & -\frac{5}{4}x^2y + \frac{1}{8}xy^2 - \frac{1}{4}xy \\ & \text{ë °ë ¼ì } a = \left(-\frac{5}{4}\right) + \frac{1}{8} + \left(-\frac{1}{4}\right) = -\frac{11}{8} \text{ ì ´ë ¨ë } \\ & |8a| = 11 \text{ ì ´ë ¨.} \end{aligned}$$

- 17.** $\ddot{e} \text{ } \grave{\alpha} \text{ } \ddot{e} \text{ } \grave{\iota} \text{ } \grave{\iota} \text{ } \ddot{e}^{\text{a}} \text{ } \ddot{e} \text{ } \S \text{ } \grave{\imath} \pm \acute{\imath} \text{ } \ddot{e} \text{ } \grave{\iota} \text{ } \grave{\iota} \text{ } x, y \text{ } \grave{\epsilon}^{\circ} \text{ } \hat{e} \mu \neg \acute{\imath} \text{ } \grave{\iota} \neg \ddot{e} \text{ } \frac{1}{4}.$

$$\left(\frac{a}{b^4}\right)^2 = \frac{a^2}{b^x}, \quad \left(\frac{b}{a^x}\right)^2 = \frac{b^2}{a^y}$$

[배점 4, 중중]

▶ 답:

▶ 답:

▶ 정답 : $x = 8$

▶ 정답 : $y = 16$

해설

$$\begin{aligned}\left(\frac{a}{b^4}\right)^2 &= \frac{a^2}{b^8} \quad \text{if } x = 8 \\ \left(\frac{b}{a^8}\right)^2 &= \frac{b^2}{a^{16}} \quad \text{if } y = 16\end{aligned}$$

- 18.** $A = \frac{x-y}{2}$, $B = \frac{x-2y+1}{3}$ 이 $\frac{1}{4}$ 일 때, $4A - 6B$ 의 값을 구하시오. [배점 4, 중중]

- ① $4x + 2y - 2$ ② $2y - 2$
③ $4x - 2y + 2$ ④ $-x + 4y + 3$
⑤ $x - 4y + 3$

해설

$$4\left(\frac{x-y}{2}\right) - 6\left(\frac{x-2y+1}{3}\right) = 2x - 2y - 2x + 4y - 2 = 2y - 2$$

19. $x = -\frac{1}{3}$, $y = 3$ 이 때 $3xy(x-y) - (4x^2y^3 - 4x^3y^2) \div 2xy$ 의 값은? [배점 4, 중중]

- ① $\frac{50}{3}$ ② $-\frac{50}{3}$ ③ $\frac{40}{3}$
 ④ $-\frac{40}{3}$ ⑤ $\frac{35}{3}$

해설

$$(3xy(x-y) - (4x^2y^3 - 4x^3y^2)) \div 2xy = 3x^2y - 3xy^2 - 2xy^2 + 2x^2y = 5x^2y - 5xy^2$$

$$x = -\frac{1}{3}, y = 3 \text{ 이 때 } 5x^2y - 5xy^2$$

$$5 \times \left(-\frac{1}{9}\right) \times 3 - 5 \times \left(-\frac{1}{3}\right) \times 9 = \frac{5}{3} + \frac{45}{3} = \frac{50}{3}$$

20. $x = \frac{a+b}{3}$, $y = \frac{a-b}{3}$ 이 때 $3ax + 6by$ 의 값은 a 와 b 의 관계로 나타낼 수 있다. 이 관계는? [배점 4, 중중]

- ① $a^2 + ab + b^2$ ② $a^2 + 2ab - 2b^2$
 ③ $a^2 + 3ab - 2b^2$ ④ $a^2 - 3ab - 2b^2$
 ⑤ $a^2 - 3ab + 2b^2$

해설

$$3a \left(\frac{a+b}{3}\right) + 6b \left(\frac{a-b}{3}\right) = a^2 + 3ab - 2b^2$$

21. $(-5x+2y) \left(\frac{1}{2}x-3y\right) = ax^2+bx+cy^2$ 이 때 a, b, c 의 값은? [배점 4, 중중]

- ① $\frac{11}{2}$ ② 6 ③ $\frac{13}{2}$ ④ 7 ⑤ $\frac{15}{2}$

해설

$$(-5x+2y) \left(\frac{1}{2}x-3y\right) = -\frac{5}{2}x^2 + 16xy - 6y^2 = ax^2 + bxy + cy^2$$

$$a = -\frac{5}{2}, b = 16, c = -6 \text{ 이 때 } a+b+c = -\frac{5}{2} + 16 - 6 = \frac{15}{2}$$

$$c = \frac{15}{2} \text{ 이 때 } a+b+c = \frac{15}{2}$$

22. $(-2a^2b^3)^4 \times \left(\frac{a}{2b^2}\right)^2 \div \{-(a^2b)^3\}$ 의 값은? [배점 5, 중상]

- ① $-4a^4b^5$ ② $-2a^6b^3$ ③ $4a^5b^4$
 ④ $-4a^6b^3$ ⑤ $2a^4b^5$

해설

$$\begin{aligned} (-2a^2b^3)^4 \times \left(\frac{a}{2b^2}\right)^2 \div \{-(a^2b)^3\} &= 16a^8b^{12} \times \frac{a^2}{4b^4} \div (-a^6b^3) \\ &= 16a^8b^{12} \times \frac{a^2}{4b^4} \times \left(-\frac{1}{a^6b^3}\right) \\ &= -4a^4b^5 \end{aligned}$$

23. $2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 \times 10 = 2^x \times 3^y \times 5^z \times 7$
 $x + y + z$ 의 값을 구하시오. [배점 5, 중상]

▶ 답:

▷ 정답: 14

해설

$$\begin{aligned} 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 \times 10 \\ = 2^8 \times 3^4 \times 5^2 \times 7 \\ x = 8, y = 4, z = 2 \\ \therefore x + y + z = 8 + 4 + 2 = 14 \end{aligned}$$

24. $(a, b) * (c, d) = \frac{ad}{bc}$ 로 정의되어 있다.
 $\left(2x^3y, -\frac{xy^4}{5}\right) * \left(-\frac{2}{3}xy^2, -\frac{2}{xy^2}\right)$ 의 값을 구하시오. [배점 5, 중상]

- ① $-\frac{25}{y^3}$ ② $-\frac{25}{y^5}$ ③ $-\frac{25}{y^7}$
 ④ $-\frac{30}{y^7}$ ⑤ $-\frac{30}{y^9}$

해설

주어진 식에 따라 계산하면 다음과 같다.

$$\begin{aligned} \left(2x^3y, -\frac{xy^4}{5}\right) * \left(-\frac{2}{3}xy^2, -\frac{2}{xy^2}\right) &= \frac{2x^3y \times \left(-\frac{2}{xy^2}\right)}{\left(-\frac{xy^4}{5}\right) \times \left(-\frac{2}{3}xy^2\right)} = \frac{-\frac{4x^2}{y}}{\frac{2x^2y^6}{15}} \\ &= \left(-\frac{4x^2}{y}\right) \times \left(\frac{15}{2x^2y^6}\right) = -\frac{30}{y^7} \end{aligned}$$

25. $x + y + z = 0$ 이고, $x\left(\frac{1}{y} + \frac{1}{z}\right) + y\left(\frac{1}{z} + \frac{1}{x}\right) + z\left(\frac{1}{x} + \frac{1}{y}\right)$ 의 값을 구하시오. ($x \neq 0, y \neq 0, z \neq 0$) [배점 5, 중상]

- ① -3 ② -2 ③ -1 ④ 0 ⑤ 3

해설

$$\begin{aligned} x\left(\frac{1}{y} + \frac{1}{z}\right) + y\left(\frac{1}{z} + \frac{1}{x}\right) + z\left(\frac{1}{x} + \frac{1}{y}\right) \\ = \frac{x}{y} + \frac{x}{z} + \frac{y}{z} + \frac{y}{x} + \frac{z}{x} + \frac{z}{y} \\ = \frac{x}{y} + \frac{z}{x} + \frac{y}{y} + \frac{z}{y} + \frac{x}{x} + \frac{z}{x} \\ = \frac{1}{x}(y + z) + \frac{1}{y}(x + z) + \frac{1}{z}(x + y) \\ = \frac{1}{x}(-x) + \frac{1}{y}(-y) + \frac{1}{z}(-z) \\ = (-1) + (-1) + (-1) = -3 \end{aligned}$$