Review for the first exam

Nikos Apostolakis

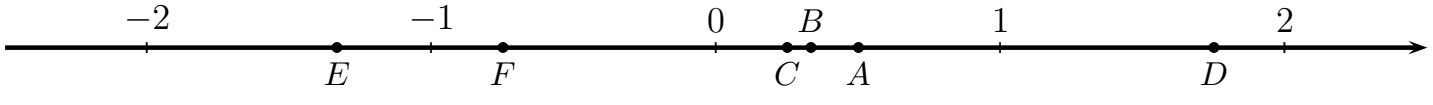
Disclaimer The following is a set of questions to help you review what we have covered in class. If you know how to answer these questions then you should do well in the exam. However there is no guarantee that the questions in the actual exam will be perceived to be similar to these questions.

1. Put the following fractions in order from smallest to largest: $\frac{13}{21}, \frac{2}{3}, \frac{5}{7}$

LCD = 21

$\frac{14}{21} = \frac{2}{3}, \quad \frac{5}{7} = \frac{15}{21} \quad \frac{13}{21}$

2. Indicate which point in the number line below corresponds to which number.



- Point ___F___ corresponds to $-\frac{4}{3}$
- Point ___A___ corresponds to $\frac{1}{2}$
- Point ___B___ corresponds to $\frac{1}{3}$
- Point ___C___ corresponds to $\frac{1}{4}$
- Point ___D___ corresponds to $\frac{7}{2}$
- Point ___F___ corresponds to $-\frac{3}{4}$

3. Evaluate: $7 - 3(2-7) - 3^3 \div 9 \cdot 3$ $= 7 - 3(2-7) - 27 - 9\,3 = 7 - 3(-5) - 3\,3$ $= 7 + 15 - 9$ $= 13$

4. Evaluate: $\frac{-25}{16} \cdot \frac{20}{-9} \cdot \left(-\frac{54}{11}\right) \cdot \frac{6}{-7} \cdot \frac{77}{50} = \frac{45}{2}$

5. Evaluate: $-4^2 + 4(-6+10)$

$= -16 + 4(4)$

6. Evaluate: $= -16 + 16 = 0$

$$\frac{1+\frac{3}{2}}{\frac{3}{10}-\frac{4}{5}} = \frac{\frac{2}{2}+\frac{3}{2}}{\frac{3}{10}-\frac{8}{10}}$$

$$= \frac{\frac{5}{2}}{-\frac{5}{10}} = \frac{\frac{5}{2}}{-\frac{1}{2}} = -\frac{5}{2} \cdot \frac{2}{1} = -5$$

$-\cancel{6}^{3}\left(-\frac{3}{\cancel{4}_{2}}\right)+\cancel{10}^{5}\left(\frac{7}{\cancel{8}_{4}}\right)-7\left(-\frac{1}{12}\right)=\frac{9}{2}+\frac{35}{4}+\frac{7}{12}=\frac{54}{12}+\frac{105}{4}+\frac{7}{12}=\frac{166}{12}=\boxed{\frac{83}{6}}$

7. Evaluate: $\frac{3}{5}-\frac{7}{10}$ $=\frac{6}{10}-\frac{7}{10}=-\frac{1}{10}$

8. Evaluate: $3-|-25-2\cdot(7-14)|$ $=3-|-25-2\cdot(-7)|=3-|-25+14|=3-|-11|$ $=3-11=\boxed{-8}$

9. Evaluate, if $a=-\frac{3}{4}$, $b=\frac{7}{8}$ and $c=-\frac{1}{12}$: $\quad -6a+10b-7c$

10. Evaluate if $x=-7$ and $y=-5$: $\quad y^2-x^2$. $(-5)^2-(-7)^2=25-49=\boxed{-24}$

11. Evaluate if $a=3$, $b=-2$, $c=7$, $d=2$, and $x=-1$: $\quad \frac{ax+b}{cx+d}$ $\frac{(3)(-1)+(-2)}{(7)(-1)+2}$ $=\frac{(-3)+(-2)}{(-7)+2}=\frac{-5}{-5}=\boxed{1}$

12. Evaluate if $x=3$: $\quad x^3-4x^2+x+6$ $=(3)^3-4(3)^2+(3)+6$ $=27-4\cdot9+3+6$ $=27-36+3+6$ $=-9+3+6$ $=\boxed{0}$

13. Evaluate $3-2x-3(x-1)$, when $x=\frac{2}{3}$. $3-2\left(\frac{2}{3}\right)-3\left(\left(\frac{2}{3}\right)-1\right)$ $=3-\frac{4}{3}-\cancel{3}\left(-\frac{1}{\cancel{3}}\right)=3-\frac{4}{3}+1$ $=4-\frac{4}{3}=\boxed{\frac{8}{3}}$

14. Evaluate $4x^2+4x+1$, when $x=-\frac{1}{2}$.

15. Evaluate each of the following expressions:

(a) $-3^2-4(-2-3\cdot2)=-9-4(-2-6)=-9-4(-8)=-9+32=\boxed{23}$

(b) $-10-(30\div15\cdot2-14)=-10-(2\cdot2-14)=-10-(4-14)=-10-(-10)=\boxed{0}$

(c) $\frac{4\cdot5+3(5-7)^2-2^2}{-3^2+5(7-8)}=\frac{4\cdot5+3(-2)^2-4}{-9+5(-1)}=\frac{4\cdot5+3(4)-4}{-9+(-5)}=\frac{20+12-4}{-14}=\frac{28}{-14}=\boxed{-2}$

16. Evaluate the expression $x^2+2xy+y^2$, when $x=-2$ and $y=-3$. $(-2)^2+2(-2)(-3)+(-3)^2=4+2(-2)(-3)+9=4+12+9=\boxed{25}$

17. Evaluate $-2x^2+3x+4$, when:

(a) $x=0$ $-2(0)^2+3(0)+4=-2\cdot0+4\cdot0+4=0+0+4=\boxed{4}$

(b) $x=1$ $-2(1)^2+3(1)+4=-2\cdot(1)+3(1)+4=-2+3+4=\boxed{5}$

(c) $x=-1$ $-2(-1)^2+3(-1)+4=-2(1)+3(-1)+4=-2+(-3)+4=\boxed{-1}$

(d) $x=-2$ $-2(-2)^2+3(-2)+4=-2(4)+3(-2)+4=-8+(-6)+4=\boxed{-10}$

(e) $x=3$ $-2(3)^2+3(3)+4=-2(9)+3(3)+4=-18+9+4=\boxed{-5}$

(f) $x=\frac{3}{2}$ $-2\left(\frac{3}{2}\right)^2+3\left(\frac{3}{2}\right)+4=-\cancel{2}^{1}\left(\frac{9}{\cancel{4}_{2}}\right)+3\left(\frac{3}{2}\right)+4=-\frac{9}{2}+\frac{9}{2}+4=\boxed{4}$

(g) $x=-\frac{2}{3}$ $-2\left(-\frac{2}{3}\right)^2+3\left(-\frac{2}{3}\right)+4=-2\left(\frac{4}{9}\right)+\cancel{3}\left(-\frac{2}{\cancel{3}}\right)+4=-\frac{8}{9}-2+4=-\frac{8}{9}+2$ $=-\frac{8}{9}+\frac{18}{9}=\boxed{\frac{10}{9}}$

18. Evaluate $\frac{y_2-y_1}{x_2-x_1}$, when

(a) $x_1=-1$, $x_2=1$, $y_1=-5$, $y_2=5$ $\frac{(5)-(-5)}{(1)-(-1)}=\frac{10}{2}=\boxed{5}$

(b) $x_1=-2$, $x_2=3$, $y_1=-3$, $y_2=4$ $\frac{(4)-(-3)}{(3)-(-2)}=\boxed{\frac{7}{5}}$

(c) $x_1=2$, $x_2=4$, $y_1=1$, $y_2=2$ $\frac{(2)-(1)}{(4)-(2)}=\boxed{\frac{1}{2}}$

$4\left(-\frac{1}{2}\right)^2+4\left(-\frac{1}{2}\right)+1=\cancel{4}^{1}\cdot\left(\frac{1}{\cancel{4}_{1}}\right)+\cancel{4}^{2}\left(-\frac{1}{\cancel{2}_{1}}\right)+1$

$=1-2+1=\boxed{0}$

(d) $x_1 = -2,\ x_2 = -3,\ y_1 = -4,\ y_2 = -6$ $\quad \frac{(-6)-(-4)}{(-3)-(-2)} = \frac{-2}{-1} = 2$

(e) $x_1 = 0,\ x_2 = 3,\ y_1 = 5,\ y_2 = 0$ $\quad \frac{(0)-(5)}{(3)-(0)} = -\frac{5}{3}$

19. Evaluate the expression $\sqrt{b^2 - 4ac}$, when:

(a) $a = -2,\ b = -1,\ c = 3$ $\quad \sqrt{(-1)^2 - 4(-2)(3)} = \sqrt{1-4(-2)(3)} = \sqrt{1+24} = \sqrt{25} = 5$

(b) $a = -3,\ b = 5,\ c = -2$ $\quad \sqrt{(5)^2 - 4(-3)(-2)} = \sqrt{25-4(-3)(-2)} = \sqrt{25-24} = \sqrt{1} = 1$

(c) $a = 15,\ b = -3,\ c = 2$ $\quad \sqrt{(-3)^2 - 4(15)(2)} = \sqrt{9-120} = \sqrt{-111}$ Not a real number

(d) $a = 15,\ b = 7,\ c = -2$ $\quad \sqrt{(7)^2 - 4(15)(-2)} = \sqrt{49-4(15)(-2)} = \sqrt{49+120} = \sqrt{169} = 13$

(e) $a = 6,\ b = 5,\ c = \frac{2}{3}$ $\quad \sqrt{(5)^2 - 4(6)\left(\frac{2}{3}\right)} = \sqrt{25-4(6)\left(\frac{2}{3}\right)} = \sqrt{25-16} = \sqrt{9} = 3$

20. Evaluate the expression $-a^2 + 3a$, when $a = 2$.

A. 10 $\quad$ B. 2 $\quad$ C. -10 $\quad$ D. -2 $\quad -(2)^2 + 3(2) = -4+3(2) = -4+6 = 2$

21. Evaluate the expression

$$\frac{5 - x^2}{3x + 4} \qquad \frac{5-(-3)^2}{3(-3)+4} = \frac{5-9}{-9+4} = \frac{-4}{-5} = \frac{4}{5}$$

when $x = -3$.

A. $\frac{14}{9}$ $\quad$ B. $-\frac{14}{9}$ $\quad$ C. $\frac{4}{5}$ $\quad$ D. $-\frac{4}{5}$

22. If x represents an unknown number then seven subtracted from twice that number is represented by the expression: A. $2(x-7)$ $\quad$ B. $2(7-x)$ $\quad$ C. $7-2x$ $\quad$ D. $2x-7$

23. Write a mathematical expression that represents the following phrase:

(a) n more than 19. $\quad 19+n$

(b) x less than 27. $\quad 27-x$

(c) 16 less than twice a number. $\quad 2x-16$

(d) 9 divided by the sum of a number and eleven. $\quad \frac{9}{x+11}$

(e) The difference of eleven times a number and five times its square. $\quad 11x-5x^2$

(f) Six subtracted from three times the sum of twice a number and its cube. $\quad 3(2x+x^3)-6$

24. If y represents an unknown number, which expression is a correct translation of the phrase:

The sum of six times a number and five, divided by eight less than the same number.

A. $\frac{30x}{x-8}$ $\quad$ B. $\frac{6x+5}{8-x}$ $\quad$ C. $\frac{6x+5}{x} - 8$ $\quad$ D. $6x + \frac{5}{8-x}$ $\quad$ E. $\frac{6x+5}{x-8}$

For the following statements indicate whether they are true or false:

$2\left(-\frac{1}{2}\right) + 8\left(\frac{3}{4}\right) = -5$

$-1 + 6 = -5$

25. If $x = -\frac{1}{2}$ and $y = \frac{3}{4}$, then $2x + 8y = -5$

A. True B. False.

26. If $x = 3$ and $y = -2$, then $x^2 + 2y = y^2 - x + 4$

$(3)^2 + 2(-2) = (-2)^2 - (3) + 4$

$9 + 2(-2) = 4 - (3) + 4$

$9 + (-4) = 1 + 4$

A. True B. False.

27. If $x = -2$ then $-x^2 - 2x = 0$

A. True B. False.

$-(-2)^2 - 2(-2) = 0$

$-(4) - 2(-2) = 0$

$-4 + 4 = 0$