MATH 1005: College Algebra
Spring 2019 – February 14
Mr. Nicholas Camacho

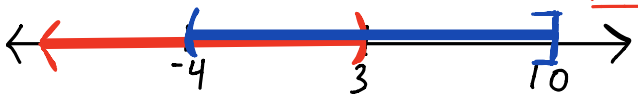
Practice Exam
Midterm 1 – Chapter P; Sections 1.1, 1.2, & 1.3
Total:_____ / 70

*Show **all** of your work in the space provided. Clearly indicate your final answer.*

1. Evaluate $-2^3 + (-3)^3 - t^0$. / 4

$-2^3 + (-3)^3 - t^0 = (-1)(2^3) + (-27) - 1$
$= -8 - 27 - 1$
$= -36$

2. Find the union and intersection of the intervals $A = (-\infty, 3)$; $B = (-4, 10]$. / 3



$A \cup B = (-\infty, 10]$ $\quad$ $A \cap B = (-4, 3)$

3. Simplify $2\left(x^{-2}y^4z\right)^{10}$, leaving only positive exponents. / 4

$2(x^{-2}y^4z)^{10} = 2(x^{-2})^{10}(y^4)^{10}(z)^{10}$
$= 2x^{-20}y^{40}z^{10}$
$= \dfrac{2y^{40}z^{10}}{x^{20}}$

4. Simplify $\left(\dfrac{xz^{10}}{y^5}\right)^{-4}$, leaving only positive exponents. / 4

$\left(\dfrac{xz^{10}}{y5}\right)^{-4} = \dfrac{(x)^{-4}(z^{10})^{-4}}{(y5)^{-4}} = \dfrac{x^{-4}z^{-40}}{y^{-20}}$

$= \dfrac{y^{20}}{x^4z^{40}}$

5. Evaluate $(10m-6)^2$. / 3

$(10m-6)^2 = (10m-6)(10m-6)$

$= \overset{F}{100m^2} \overset{O}{-60m} \overset{I}{-60m} \overset{L}{+36}$

$= 100m^2 - 120m + 36$

6. Factor $16x^2 - 24x + 9$. / 3

$A = 4x$ Is $-24x$ equal to either $2AB$ or $-2AB$?

$B = 3$

$A^2 + 2AB + B^2 = (A+B)^2$ $\quad 2 \cdot 4x \cdot 3 = 24x$

$A^2 - 2AB + B^2 = (A-B)^2$ $\quad -2 \cdot 4x \cdot 3 = -24x$ ✓

$16x^2 - 24x + 9 = (4x-3)^2$

7. Factor $x^2 - 100x - 101$. / 3

$(x-101)(x+1)$

8. Evaluate $\dfrac{(x-2)(x+4)}{(x^2+4x-21)} \cdot \dfrac{(x-3)(x+7)}{(x^2+x-12)}$. / 3

$\dfrac{(x-2)(x+4)}{(x+7)(x-3)} \cdot \dfrac{(x-3)(x+7)}{(x+4)(x-3)} = \dfrac{(x-2)(x+4)(x-3)(x+7)}{(x+7)(x-3)(x+4)(x-3)}$

$= \dfrac{x-2}{x-3}$

$A^2 - B^2 = (A-B)(A+B)$

9. Simplify $\dfrac{x^2-16}{(x-4)(x-5)}$. / 3

$$\frac{x^2-16}{(x-4)(x-5)} = \frac{(x+4)(x-4)}{(x-4)(x-5)} = \frac{x+4}{x-5}$$

10. Evaluate $\dfrac{2}{25}+\dfrac{7}{125}$. / 2

$$\frac{2}{25}+\frac{7}{125} = \frac{5}{5}\cdot\frac{2}{25}+\frac{7}{125}$$
$$= \frac{10}{125}+\frac{7}{125}$$
$$= \frac{17}{125}.$$

11. Evaluate $\dfrac{3x}{(3x-7)\left(x-\frac{2}{3}\right)}+\dfrac{x^2}{\left(x-\frac{2}{3}\right)^2}$. / 4

LCD $(3x-7)\left(x-\frac{2}{3}\right)^2$

$$\frac{3x}{(3x-7)\left(x-\frac{2}{3}\right)}\cdot\frac{\left(x-\frac{2}{3}\right)}{\left(x-\frac{2}{3}\right)} = \frac{3x\left(x-\frac{2}{3}\right)}{(3x-7)\left(x-\frac{2}{3}\right)^2} = \frac{3x^2-2x}{(3x-7)\left(x-\frac{2}{3}\right)^2}$$

$$\frac{x^2}{\left(x-\frac{2}{3}\right)^2}\cdot\frac{(3x-7)}{(3x-7)} = \frac{3x^3-7x^2}{(3x-7)\left(x-\frac{2}{3}\right)^2}$$

$$\frac{3x^2-2x}{(3x-7)\left(x-\frac{2}{3}\right)^2}+\frac{3x^3-7x^2}{(3x-7)\left(x-\frac{2}{3}\right)^2} = \frac{3x^3-4x^2-2x}{(3x-7)\left(x-\frac{2}{3}\right)^2}$$

12. Evaluate $(-25)^{\frac{1}{2}}$, or state that it is not a real number. / 2

$(-25)^{1/2} = \sqrt{-25}$ not a real number!

13. Evaluate $(-32)^{\frac{1}{5}}$, or state that it is not a real number. / 2

$(-32)^{1/5} = \sqrt[5]{-32}$ = a number whose 5th power is -32

$= -2$.

14. Simplify $\sqrt{27x} + \sqrt{48x}$. / 3

$\sqrt{27x} + \sqrt{48x} = \sqrt{9 \cdot 3 \cdot x} + \sqrt{16 \cdot 3 \cdot x}$

$= \sqrt{9} \cdot \sqrt{3} \cdot \sqrt{x} + \sqrt{16} \cdot \sqrt{3} \cdot \sqrt{x}$

$= 3\sqrt{3x} + 4\sqrt{3x}$

$= 7\sqrt{3x}$

15. Rationalize the denominator in the expression $\frac{\sqrt{17}}{\sqrt{2}}$, i.e. change the expression so that no radical appears in the denominator. / 2

$\frac{\sqrt{17}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{17} \cdot \sqrt{2}}{2} = \frac{\sqrt{34}}{2}$

16. Solve for x: $14x - 3 - (3x - 1) = 20$. / 2

17. The area of a trapezoid is given by $A = \frac{1}{2}h(a+b)$, where a and b represent the lengths of the two parallel sides of the trapezoid, and h is the height. Find b. / 3

$A = \frac{1}{2}h(a+b)$

$A = \frac{1}{2}(ha+hb)$

$A = \frac{1}{2}ha + \frac{1}{2}hb$

$\frac{A - \frac{1}{2}ha}{\frac{1}{2}h} = \frac{\frac{1}{2}hb}{\frac{1}{2}h}$

$\frac{2A - ha}{h} = b$

18. An item is on sale for %30 off the original price. If the sale price is \$805, what is the original price of the computer? / 5

x = original price

$1x - .3x = 805$

$.7x = 805$

$\frac{7}{10}x = 805$

$7x = 8050$

$$\begin{array}{r} 1150 \\ 7\overline{)8050} \\ \underline{7} \\ 10 \\ \underline{7} \\ 35 \\ \underline{35} \\ 00 \end{array}$$

$\boxed{x = 1{,}150}$

19. The length of a rectangle is 3 feet more than twice its width. The perimeter of the rectangle is 60 feet. Find the length and width of the rectangle. / 5

l = length of rectangle

w = width of rectangle

(1) $l = 2w + 3$

(2) $60 = 2l + 2w$ (perimeter formula)

$60 = 2(2w+3) + 2w$

$60 = 4w + 6 + 2w$

$60 = 6w + 6$

$54 = 6w$

$\boxed{w = 9}$

$l = 2(9) + 3$

$l = 18 + 3$

$\boxed{l = 21}$

20. Solve $6y^2 + 11y = 10$ by using the quadratic formula. / 5

Change to: $6y^2 + 11y - 10 = 0$

Then $y = \dfrac{-(11) \pm \sqrt{11^2 - 4(6)(-10)}}{2(6)}$

$= \dfrac{-11 \pm \sqrt{121 + 240}}{12}$

$= \dfrac{-11 \pm \sqrt{361}}{12}$

21. Solve $x^2 + 6x = -7$ by completing the square. / 5

$x^2 + 6x = -7$

$x^2 + 6x + \left(\frac{6}{2}\right)^2 = -7 + \left(\frac{6}{2}\right)^2$

$(x+3)^2 = -7 + 9$

$(x+3)^2 = 2$

$x + 3 = \pm\sqrt{2}$

$\boxed{x = -3 \pm \sqrt{2}}$