

First 3 letters of last name:

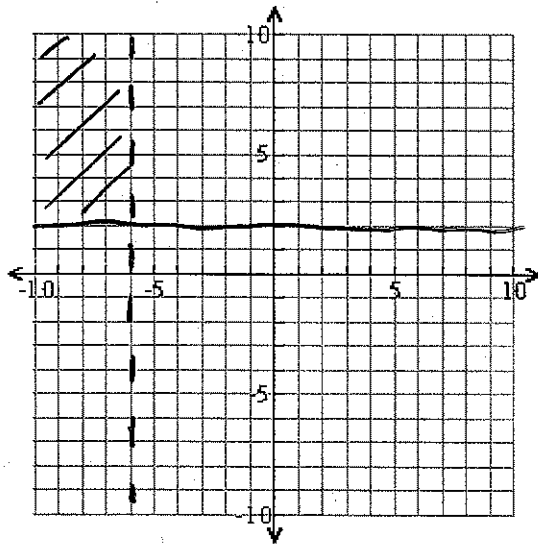
K E Y

Printed name: Purple

Circle your section:

513 514 515 516 517 518

1. (5 points) Shade the region of the coordinate plane that contains the set of ordered pairs $\{x, y | x < -6, y \geq 2\}$



2. (8 points) Simplify completely

$$\frac{2x + 10}{x^2 - x - 2} \div \frac{x^2 - 25}{x^2 + 5x - 14}$$

$$\frac{2(x+5)}{(x-2)(x+1)} \cdot \frac{(x+7)(x-2)}{(x+5)(x-5)} = \frac{2(x+7)}{(x+1)(x-5)}$$

(5 points extra credit) state all restrictions on the variable x in the equation above.

3 $x \neq 2, -1, 5, -5, -7$

3. (9 points) Solve for x :

$$\sqrt{x+6} - \sqrt{x} = 2$$

$$(\sqrt{x+6})^2 = (2 + \sqrt{x})^2$$

$$x+6 = 4 + 4\sqrt{x} + x$$

$$2 = 4\sqrt{x}$$

$$\sqrt{x} = 1/2 \Rightarrow \boxed{x = 1/4}$$

4. (8 points) Find all possible solutions for x .

$$-3|-2-x| = 3x-12$$

A) $x \in \{2, 1\}$ B) $x \in \{3, 1\}$ C) $x \in \{-6, 1\}$ D) $x \in \{1\}$ E) None of these

$$|-2-x| = -x+4$$

$$-2-x = -x+4$$

$$-2 = 4 \quad \text{!}$$

No solution

$$2+x = -x+4$$

$$2x = 2$$

$$x = 1$$

5. (6 points) Completely multiply out

$$[(x+5)(x-5)]^2$$

$$[x^2 - 25]^2 \quad \text{(FOIL)}$$

$$(x^2 - 25)(x^2 - 25)$$

$$\boxed{x^4 - 50x^2 + 625}$$

8. (8 points) Find the standard equation of the circle whose center is the midpoint of the line segment with endpoints $(4, -2)$ and $(8, 6)$ and whose diameter is $\sqrt{3}$.

A) $(x-6)^2 + (y-2)^2 = 3$ B) $(x+6)^2 + (y+2)^2 = 3$ C) $(x+6)^2 + (y+2)^2 = \frac{3}{4}$

D) $(x-6)^2 + (y-2)^2 = \frac{3}{4}$ E) None of these

midpoint: $\left(\frac{8+4}{2}, \frac{6-2}{2}\right) = (6, 2) = (h, k)$

radius = $\frac{\sqrt{3}}{2}$

$r^2 = \frac{3}{4}$

$(x-h)^2 + (y-k)^2 = r^2$

9. (6 points) Fully simplify

$(\sqrt{-9}-1)(-3+4i)$

$(-1+3i)(-3-4i) = 3+4i-9i-12i^2$

$= 3-5i+12 = 15-5i$

recall: $i^2 = -1$

10. (6 points) Fully simplify

$|-2(3-5i)|$

A) $2\sqrt{34}$

B) 8

C) $\sqrt{34}$

D) 14

E) None of these

Method 1:

$2\sqrt{3^2+5^2}$

$= 2\sqrt{34}$

Since

$|a(b+ci)| = |a||b+ci|$

Method 2: multiply out.

$|-6+10i|$

$= \sqrt{36+100}$

$= \sqrt{136}$

$= 2\sqrt{34}$

$$\begin{array}{r} 2 \overline{)136} \\ \underline{2 \overline{)68}} \\ \underline{2 \overline{)34}} \\ 17 \end{array}$$

6. (10 points) Perform polynomial long division on $(x^3 - 2x - 8) \div (x - 2)$. Identify the remainder and express it as a fraction of the divisor.

type. ~~should have been~~ $x-2$

A) $\frac{4}{x+2}$ B) $\frac{-12}{x-2}$ C) $\frac{-4}{x+2}$ D) $\frac{12}{x-2}$ E) None of these

or

$$\begin{array}{r}
 x^2 + 2x + 2 \\
 x-2 \overline{) x^3 + 0x^2 - 2x - 8} \\
 \underline{-(x^3 - 2x^2)} \\
 2x^2 - 2x \\
 \underline{-(2x^2 - 4x)} \\
 2x - 8 \\
 \underline{-(2x - 4)} \\
 -4
 \end{array}$$

7. (10 points) Simplify completely and state all restrictions on the variable.

$$\frac{\frac{4}{y} - \frac{6}{5y+2}}{8 - \frac{7}{y}}$$

Common denominator

$$\frac{\frac{4}{y} \left(\frac{5y+2}{5y+2} \right) - \frac{6}{5y+2} \left(\frac{y}{y} \right)}{\frac{8}{1} \left(\frac{y}{y} \right) - \frac{7}{y}} = \frac{\frac{20y+8-6y}{y(5y+2)}}{\frac{8y-7}{y}}$$

$$= \frac{14y+8}{y(5y+2)} \cdot \frac{y}{8y-7} = \boxed{\frac{14y+8}{(5y+2)(8y-7)}}$$

$$\boxed{y \neq 0, \frac{7}{8}, -\frac{2}{5}}$$

11. (8 points) Let a be a positive real number; $a > 0$. Solve for x :

$$|2x - 5| \geq 8a + 3$$

- A) $(-\infty, -4a+1] \cup [4a+4, \infty)$ B) $(-\infty, -4a-4] \cup [4a+4, \infty)$ C) $[-4a+1, 4a+4]$
 D) $[-4a-1, 4a+1]$ E) None of these

$$2x - 5 \geq 8a + 3$$

$$2x \geq 8a + 8$$

$$x \geq 4a + 4$$

$$[4a+4, \infty)$$

$$-2x + 5 \geq 8a + 3$$

$$-8a + 2 \geq 2x$$

$$-4a + 1 \geq x$$

$$(-\infty, -4a+1]$$

$$a > 0$$

so

$$4a+4 >$$

$$-4a+1$$

12. (6 points) Fully simplify leaving a radical symbol in your answer (no fractional exponents):

$$\sqrt[12]{2^{12}x^{13}y^{24}z^{12}}$$

$$2xy^2z \sqrt{x} \text{ or } 2|x|y^2|z|\sqrt{x}$$

13. (10 points) Fully simplify

$$\frac{\left(\frac{1}{5}\right)^{-19} + (5^3)^6}{(5^2)^{10} - 5^{22}}$$

A) 5^{21}

B) $\frac{-1}{120}$

C) $\frac{1}{24}$

D) $\frac{-1}{100}$

E) none of these

$$\frac{5^{19} + 5^{18}}{5^{20} - 5^{22}}$$

factor
=

$$\frac{5^{18}(5+1)}{5^{20}(1-5^2)} =$$

$$\frac{1(6)}{5^2(-24)} = \frac{6}{25(-24)} = \frac{-1}{100}$$

Handwritten notes at the top of the page, including the word "Introduction" and several lines of text that are mostly illegible due to fading.

Introduction

Main body of handwritten text, consisting of several paragraphs. The text is very faint and difficult to read, but appears to be a detailed introduction or overview of a subject.