

1) Which choice is the answer to this problem?

(7 points)

$$(3+2i)(2-4i)-(6-3i)$$

$$= (6-12i+4i-8i^2)-(6-3i)$$

$$= (6-8i+8)-(6-3i)$$

$$= 14-8i-6+3i$$

$$= 8-5i$$

Choice D

A. $8+11i$

B. $8-11i$

C. $-10-5i$

D. $8-5i$

E. $-8-5i$

2) Find all real solutions to the following equation. If there are more than one solution, separate answers with commas.

(7 points)

$$2|2x-3|-5=29$$

$$2|2x-3|=34$$

$$|2x-3|=17$$

$$2x-3=-17 \quad \text{or} \quad 2x-3=17$$

$$2x=-14 \qquad 2x=20$$

$$x=-7 \qquad x=10$$

- 3) Solve the equation below. Which statement choice is true?
(6 points)

$$\sqrt{42-2x} = x+3$$

$$(\sqrt{42-2x})^2 = (x+3)^2$$

$$42-2x = x^2+3x+3x+9$$

$$0 = x^2+8x-33$$

$$0 = (x+11)(x-3)$$

$$x+11=0 \quad \text{or} \quad x-3=0$$

$$x = -11 \quad \quad \quad x = 3$$

checks

$$\sqrt{42-2(-11)} \quad ? = ? \quad -11+3 \quad \quad \sqrt{42-2(3)} \quad ? = ? \quad 3+3$$

$$\sqrt{42+22} \quad \quad -8 \quad \quad \sqrt{42-6} \quad \quad 6$$

$$\sqrt{64} = 8, \text{ not } -8 \quad \quad \sqrt{36} = 6$$

The -11 does not check, the 3 does check.

$$x = 3 \text{ only} \quad \text{CHOICE A}$$

- A. There is one solution and it is positive.
 B. There is one solution and it is negative.
 C. There are two solutions, both positive.
 D. There are two solutions, one positive and one negative.
 E. There are two solutions, both negative.

- 4) Solve this inequality. Write the solution using interval notation.
(7 points)

$$|2x+1|+3 < 6$$

$$|2x+1| < 3$$

$$-3 < 2x+1 < 3$$

$$-4 < 2x < 2$$

$$-2 < x < 1 \quad \quad (-2,1)$$

- 5) Is the point $(3, -4)$ on the perpendicular bisector of the segment AB where $A(5,0)$ and $B(7, -2)$. Show me proof (organized steps) that it is or it is not.

(7 points)

Is distance from the point to A = distance from the point to B ?

$$\sqrt{(5-3)^2 + (0-(-4))^2} \text{ (? = ?)} \sqrt{(7-3)^2 + (-2-(-4))^2}$$

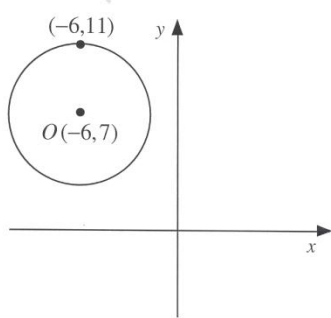
$$\sqrt{2^2 + 4^2} \text{ (? = ?)} \sqrt{4^2 + 2^2}$$

$$\sqrt{20} = \sqrt{20}$$

Since the distances are the same, the point $(3, -4)$ is on the perpendicular bisector of segment AB .

- 6) The equation of the circle below is which choice? The center of the circle and a point on the circle are labeled.

(6 points)



The distance between the center and the point shown is 4 units, so the radius length is 4. $r = 4$

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

$$(x-(-6))^2 + (y-7)^2 = 4^2$$

$$(x+6)^2 + (y-7)^2 = 16$$

Choice E

A. $(x+6)^2 + (y-7)^2 = 49$

B. $(x-6)^2 + (y+7)^2 = 16$

C. $(x-6)^2 + (y+7)^2 = 4$

D. $(x-6)^2 + (y+7)^2 = 49$

E. $(x+6)^2 + (y-7)^2 = 16$

- 7) Use the 'completing the square' process to write the equation of the following circle in standard form $(x-h)^2 + (y-k)^2 = r^2$.

(6 points)

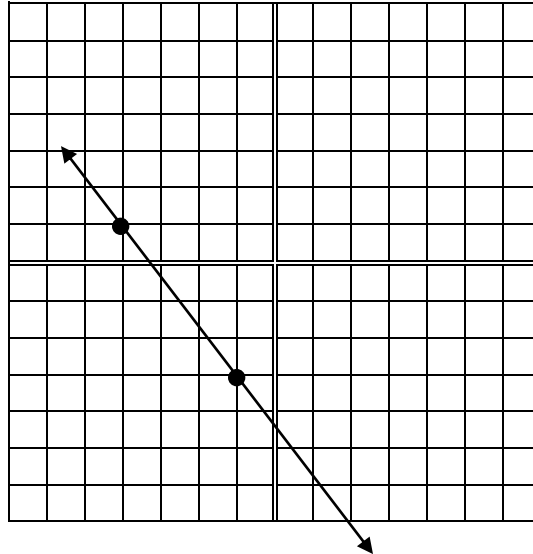
$$x^2 + y^2 - 8x + 10y + 25 = 0$$

$(x^2 - 8x + \quad) + (y^2 + 10y + \quad) = -25$ Complete the square and balance equation.

$$(x^2 - 8x + (-4)^2) + (y^2 + 10y + 5^2) = -25 + (-4)^2 + 5^2$$

$$(x-4)^2 + (y+5)^2 = 16$$

- 8) Which equation represents a line shown below? Assume each hash mark is one unit.
(7 points)



- A $4x - 3y = -13$
 B $3x + 4y = -13$
 C $3x - 4y = -13$
 D $4x + 3y = -13$
 E None of the above.

Counting rise/run; the slope is $-4/3$. Using the point $(-4, 1)$, we get the equation below.

$$y - 1 = -\frac{4}{3}(x - (-4))$$

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

$$3y - 3 = -4(x + 4)$$

$$3y - 3 = -4x - 16$$

$$4x + 3y = -13$$

Choice D

- 9) Write the domain for the function below. Use interval notation.
(7 points)

$$f(x) = \sqrt{2x + 4}$$

$$\text{radicand} \geq 0$$

$$2x + 4 \geq 0$$

$$2x \geq -4$$

$$x \geq -2$$

$$D = [-2, \infty)$$

- 10) Find a linear equation given the following two function values.
(7 points)

$$f(-2) = 5 \text{ and } f(3) = -10$$

Given: Points $(-2, 5)$ and $(3, -10)$

$$m = \frac{-10 - 5}{3 - (-2)} = \frac{-15}{5} = -3$$

Using the point $(3, -10)$...

$$y - (-10) = -3(x - 3)$$

$$y + 10 = -3x + 9$$

$$y = -3x - 1$$

Choice E

A. $y = -3x - 11$

B. $y = -\frac{1}{3}x - \frac{17}{3}$

C. $y = -\frac{1}{3}x + \frac{13}{3}$

D. $y = 3x + 11$

E. $y = -3x - 1$

- 11) Given a function $y = f(x)$. How would the graph of the function $y = f(x-3) - 2$ compare to the graph of function f ?

(6 points)

1st: The opposite of -3 inside the 'grouping' means 'shifted' 3 units right.
 2nd: The -2 outside the 'grouping' means 'shifted' 2 units down'.

Choice A

- A. Shifted 3 units right and shifted 2 units down
- B. Shifted 3 units left and shifted 2 units down
- C. Shifted 3 units right and shifted 2 units up
- D. Shifted 3 units left and shifted 2 units up
- E. None of the above.

- 12) Point A $(-2, 5)$ is on the graph of function g . Find the corresponding point on the graph of $y = 3g(x+1) - 4$.

(7 points)

The 1 inside the parentheses says the x -coordinate has been shifted 1 unit left. The 3 multiplied by the function g says the y -coordinate has first been stretched vertically by a factor 3, then the -4 says it has been shifted down 4 units. The x -coordinate of -2 becomes -3. The y -coordinate of 5 becomes 11. Corresponding point: $(-3, 11)$

- 13) If $f(x) = 2x^2 - 5x$, find $f(2a-3)$.

(7 points)

$$\begin{aligned}
 f(2a-3) &= 2(2a-3)^2 - 5(2a-3) \\
 &= 2(4a^2 - 6a - 6a + 9) - 5(2a-3) \\
 &= 2(4a^2 - 12a + 9) - 5(2a-3) \\
 &= 8a^2 - 24a + 18 - 10a + 15 \\
 &= 8a^2 - 34a + 33
 \end{aligned}$$

14) Find all solutions of the following equation.

(7 points)

$$x^4 - 10x^2 + 24 = 0 \quad \text{Let } u = x^2$$

$$u^2 - 10u + 24 = 0$$

$$(u - 6)(u - 4) = 0$$

$$u - 6 = 0 \quad \text{or} \quad u - 4 = 0$$

$$u = 6 \quad u = 4$$

$$x^2 = 6 \quad x^2 = 4$$

$$x = \pm\sqrt{6} \quad x = \pm\sqrt{4}$$

$$x = \sqrt{6}, -\sqrt{6}, 2, -2 \quad \text{Choice A}$$

- A. $x = 2, -2, \sqrt{6}, -\sqrt{6}$
- B. $x = 2i, -2i, \sqrt{6}, -\sqrt{6}$
- C. $x = 2, -2, 6$
- D. $x = 2, -2$
- E. $x = 4, 6$

15) Find the distance (in simplified form) between points $(0, -7)$ and $(3, -4)$.

(6 points)

$$\begin{aligned} d &= \sqrt{(-4 - (-7))^2 + (3 - 0)^2} \\ &= \sqrt{(-4 + 7)^2 + 3^2} \\ &= \sqrt{9 + 9} \\ &= \sqrt{18} = \sqrt{9(2)} = \sqrt{9} \cdot \sqrt{2} \\ &= 3\sqrt{2} \end{aligned}$$

Choice C

- A. $\sqrt{130}$
- B. $7\sqrt{2}$
- C. $3\sqrt{2}$
- D. 3
- E. $\sqrt{180}$