

Name: **SOLUTIONS** Place your answers in the spaces provided. You must show correct work to receive credit.(12 pts) 1. Given the points $A(-4,6)$ and $B(2,-1)$, answer each of the following:(6 pts) (a) Find the distance between A and B .

$$\begin{aligned} d(A,B) &= \sqrt{(2+4)^2 + (-1-6)^2} \\ &= \sqrt{36+49} = \sqrt{85} \end{aligned}$$

$\sqrt{85}$

(6 pts) (b) Find the midpoint of \overline{AB} .

$$\frac{-4+2}{2}, \frac{6-1}{2}$$

$$\frac{-2}{2}, \frac{5}{2}$$

$-1, \frac{5}{2}$

(6 pts) 2. Write $(2-5i)^2$ in the form $a+bi$, where a and b are real numbers.

$$\begin{aligned} (2-5i)^2 &= (2-5i)(2-5i) \\ &= 4-10i-10i+25i^2 \\ &= 4-20i-25 \\ &= -21-20i \end{aligned}$$

$-21-20i$

(10 pts) 3. Find the center and radius of the circle:

$$x^2 + y^2 - 8x + 12y - 3 = 0$$

$$\begin{aligned} x^2 - 8x + \underline{16} + y^2 + 12y + \underline{36} &= 3 + \underline{16} + \underline{36} \\ (x-4)^2 + (y+6)^2 &= 55 \end{aligned}$$

Center:

$(4,-6)$

radius =

$\sqrt{55}$

Name: **SOLUTIONS** Place your answers in the spaces provided. You must show correct work to receive credit.(10 pts) 4. Solve for x . Simplify your answer(s) as much as possible.

$$3x^2 - 2x + 4 = 0$$

$$\begin{aligned} x &= \frac{-(-2) \pm \sqrt{(-2)^2 - 4(3)(4)}}{2(3)} \\ &= \frac{2 \pm \sqrt{4 - 48}}{6} = \frac{2 \pm \sqrt{-44}}{6} \\ &= \frac{2 \pm 2i\sqrt{11}}{6} \end{aligned}$$

$$x = \boxed{\frac{1 \pm i\sqrt{11}}{3} \text{ or } \frac{1}{3} \pm \frac{i\sqrt{11}}{3}}$$

(8 pts) 5. Solve the following inequality for x . Express your answer in interval notation.

$$\left| \frac{2x - 3}{4} \right| < 5$$

$$-5 < \frac{2x - 3}{4} < 5$$

$$-20 < 2x - 3 < 20$$

$$-17 < 2x < 23$$

$$-\frac{17}{2} < x < \frac{23}{2}$$

$$\boxed{-\frac{17}{2}, \frac{23}{2}}$$

(8 pts) 6. Find an equation of the line that passes through the point $P(5, -2)$ and has slope $\frac{1}{3}$. Leave your answer in the form $ax + by = c$, where a, b , and c are integers.

$$y - y_1 = m(x - x_1)$$

$$y - (-2) = \frac{1}{3}(x - 5)$$

$$3(y + 2) = \frac{1}{3}x - \frac{5}{3} \quad 3$$

$$3y + 6 = x - 5$$

or

$$y = mx + b$$

$$-2 = \frac{1}{3}(5) + b$$

$$b = -\frac{11}{3}$$

$$y = \frac{1}{3}x - \frac{11}{3}$$

$$\boxed{x - 3y = 11 \text{ or } -x + 3y = -11}$$

Name: **SOLUTIONS**

Place your answers in the spaces provided. You must show correct work to receive credit.

(10 pts) 7. Solve the following inequality for x . Express your answer in interval notation.

$$2x^2 + 7x - 4 > 0$$

$$2x^2 + 7x - 4 = 0$$

$$(2x - 1)(x + 4) = 0$$

$$2x - 1 = 0 \quad x = \frac{1}{2}$$

$$x + 4 = 0 \quad x = -4$$

	$(-\infty, -4)$	$(-4, \frac{1}{2})$	$(\frac{1}{2}, \infty)$
$2x-1$	-	-	+
$x+4$	-	+	+
Result	+	-	+

$(-\infty, -4] \cup [\frac{1}{2}, \infty)$

(16 pts) 8. Solve for x . Check your answer(s).

(8 pts) (a) $x - 4 = \sqrt{2x - 5}$

$$x - 4 = \sqrt{2x - 5}$$

$$(x - 4)^2 = (\sqrt{2x - 5})^2$$

$$x^2 - 8x + 16 = 2x - 5$$

$$x^2 - 10x + 21 = 0$$

$$(x - 7)(x - 3) = 0$$

$$x = 7, x = 3$$

$$x = 7 \quad 7 = 4 + \sqrt{9}$$

$$x = 3 \quad 3 \neq 4 + \sqrt{1}$$

$x = 7$

(8 pts) (b) $x^4 - 7x^2 + 12 = 0$

$$(x^2 - 4)(x^2 - 3) = 0$$

$$x^2 - 4 = 0, \quad x^2 - 3 = 0$$

$$x^2 = 4, \quad x^2 = 3$$

$$x = \pm 2, \quad x = \pm \sqrt{3}$$

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

Name: **SOLUTIONS** Place your answers in the spaces provided. You must show correct work to receive credit.

- (10 pts) 9. A manufacturer of cans wishes to construct a closed right circular cylindrical can of height 10 cm and the can is to have surface area 1200 cm^2 . Find the inner radius, r , of the can.
Hint: surface area = $2 r^2 + 2 rh$. (Set up an equation and solve.)

$$2 r^2 + 2 r(10) = 1200$$

$$\frac{2 r^2 + 20 r}{2} = \frac{1200}{2}$$

$$r^2 + 10r = 600$$

$$r^2 + 10r - 600 = 0$$

$$(r + 30)(r - 20) = 0$$

$$r = -30, \quad r = 20$$

$$r = \boxed{20 \text{ cm}}$$

- (10 pts) 10. The local fitness club is gaining members at a constant rate since it has had its grand opening. There were 180 members after 15 days. After 28 days, there were 271 members. Assume that the relationship between the number of members and the number of days since the club's grand opening is linear. Express the number of members, N , in terms of the number of days, d , since the club's grand opening.

$$(15, 180)$$

$$(28, 271)$$

$$m = \frac{271 - 180}{28 - 15} = 7$$

$$N - N_1 = m(d - d_1)$$

$$N - 180 = 7(d - 15)$$

$$N - 180 = 7d - 105$$

$$N = 7d + 75$$

$$\boxed{N = 7d + 75}$$

Name: **SOLUTIONS**