1. Solve the equation.

$1. \left[ \frac{m+2}{3} - \frac{m-4}{4} + \frac{m+1}{6} = 1 \right]$

$4(m+2) - 3(m-4) = 2(m+1) - 12$
$4m + 8 - 3m + 12 = 2m + 2 - 12$
$m + 20 = 2m - 10$
$m = 30$

$2. \left[ \frac{1}{m-1} = \frac{5m}{m^2+3m-4} - \frac{3}{m+4} \right]$

$(m+4)(m-1)$

$m+4 = 5m - 3(m-1)$
$4m + 4 = 5m - 3m + 3$
$m + 4 = 2m + 2$

NO SOLUTION

3. $2x^2 - 3x - 5 = 0$

$(2x - 5)(x + 1) = 0$
$2x - 5 = 0 \quad x + 1 = 0$
$x = \frac{5}{2} \quad x = -1$

4. $\left[ \frac{n}{3n+2} + \frac{4}{n-2} \right]$

$(3n+2)(n-3)$

$n(n-3) + (3n+2)(n-3) = 4(3n+2)$
$n^2 - 2n + 3n^2 - 4n - 4 = 12n + 8$
$4n^2 - 6n - 4 = 12n + 8$
$4n^2 - 18n - 12 = 0$
$2n^2 - 9n - 6 = 0$

$y = \frac{-9 \pm \sqrt{(-9)^2 - 4(2)(-6)}}{2(2)}$
$= \frac{9 \pm \sqrt{81 + 48}}{4}$
$= \frac{9 \pm \sqrt{129}}{4}$
5. \( \sqrt{51-14x+4} = x-2 \)

\[
(\sqrt{51-14x})^2 = (x-6)^2
\]

\( 51-14x = x^2 - 12x + 36 \)

\( 0 = x^2 + 2x - 15 \)

6. \( (3x-4)^2 - 2 = 11 \)

\[
\sqrt{(3x-4)^2} = \sqrt{13}
\]

\( 3x - 4 = \pm \sqrt{13} \)

\( 3x = 4 \pm \sqrt{13} \)

7. \( 4x^2 + 24x = -160 \)

\( 4x^2 + 24x + 160 = 0 \)

\( x^2 + 6x + 40 = 0 \)

\( x = \frac{-6 \pm \sqrt{6^2 - 4(1)(40)}}{2(1)} \)

\( x = \frac{-6 \pm \sqrt{36 - 160}}{2} \)

8. \( 7d^2 + 5 = 0 \)

\( 7d^2 = -5 \)

\( d^2 = \frac{-5}{7} \)

\( d = \pm \sqrt{\frac{5}{7}} \) or \( d = \pm \frac{\sqrt{35}}{7} \) i

9. \( 6 = 7 + |9x - 3| \)

\( |9x - 3| = -1 \)

**No solution**
10. \[ \left| \frac{2}{3} - \frac{1}{3} \right| = \frac{7}{6} = \frac{1}{2} \]

\[ \left| 2 - \frac{5}{3} \right| = \frac{5}{3} \]

\[ 2 - \frac{1}{3}x \quad \text{or} \quad 2 - \frac{5}{3}x = \frac{5}{3} \]

\[ \frac{-1}{3}x = -\frac{1}{3} \quad \text{or} \quad \frac{-5}{3}x = \frac{-11}{3} \]

\[ x = 1 \quad \text{or} \quad x = 11 \]

II. Solve

1. Monique plans to join a gym so that she can use weights and participate in fitness classes. Gym A costs $300/yr plus $4 for each fitness class. Gym B costs $360/yr plus $2 for each class.

   a. Write a model representing the cost \( C_A \) (in $) for Gym A if Monique attends \( x \) fitness classes.

   \[ C_A = 300 + 4x \]

   b. Write a model representing the cost \( C_B \) (in $) for Gym B if Monique attends \( x \) fitness classes.

   \[ C_B = 360 + 2x \]

   c. For how many fitness classes will the cost for the two gyms be the same?

   \[ 300 + 4x = 360 + 2x \]

   \[ 2x = 60 \]

   \[ x = 30 \text{ classes} \]

2. The stopping distance \( d \) (in ft) for a car on a certain road is given by \( d = 0.048v^2 + 2.2v \), where \( v \) is the speed of the car in mph the instant before the brakes were applied.

   a. If the car was traveling 50 mph before the brakes were applied, find the stopping distance.

   \[ d = 0.048(50)^2 + 2.2(50) \]

   \[ = 230 \text{ ft.} \]
b. If the stopping distance is 390 ft, how fast was the car traveling before the brakes were applied? Round to the nearest mile per hour.

\[390 = 0.048v^2 + 2.2v\]
\[0.048v^2 + 2.2v - 390 = 0\]
\[v = \frac{-2.2 \pm \sqrt{2.2^2 - 4(0.048)(-390)}}{2(0.048)}\]
\[v = \frac{-2.2 \pm \sqrt{79.72}}{0.096} \approx -22 + 179.72\]

We can leave out the negative part since we can't have a negative speed.

\[v \approx 70\text{ mph}\]

3. The population of the United States since the year 1950 can be approximated by 

\[P = 0.009t^2 + 2.05t + 182\]

where \(P\) is the population in millions and \(t\) represents the number of years since 1950. Use this model to approximate the year in which the population reached 300 million. Round to the nearest year.

\[300 = 0.009t^2 + 2.05t + 182\]
\[0.009t^2 + 2.05t - 118 = 0\]

We can leave out the negative part since we don't want negative time.

III. Solve the inequality. Write the solution set in interval notation.

1. \(-8t + 1 < 17\)

\[-8t < 16\]
\[t > -2\]

\((-2, \infty)\)

2. \(-14 < 3(m - 7) + 7\)

\[-14 < 3m - 21 + 7\]
\[-3m - 14 < -14\]
\[-3m < 0\]

\((-3, 0)\)

3. \(-3 < -2x + 1 \leq 9\)

\[-4 < -2x \leq 8\]
\[2 > x \geq -4\]

or

\[-4 \leq x < 2\]

\((-4, 2)\)
4. \(-2 \leq \frac{4x-1}{3} \leq 5\)
   \[-6 \leq 4x-1 \leq 15\]
   \[-5 \leq 4x \leq 16\]
   \[-\frac{5}{4} \leq x \leq 4\]

5. \(3|4-x| - 2 < 16\)
   \[3|4-x| < 18\]
   \[|4-x| < 6\]
   \[-10 < -x < 2\]
   \[10 < x > -2\]
   \[-2 < x < 10\]

6. \(5|x+1| - 9 \geq -4\)
   \[5|x+1| \geq 5\]
   \[|x+1| \geq 1\]
   \[x+1 \geq 1 ~ \text{or} ~ x+1 \leq -1\]
   \[x \geq 0 ~ \text{or} ~ x \leq -2\]
   \[(-\infty, -2] \cup [0, \infty)\]

IV. Perform the indicated operation. Write answer in standard form, \(a+bi\).

1. \((2-7i) - (9+5i)\)
   \[-7 - 12i\]

2. \((10-3i)^2\)
   \[100 - 60i + 9i^2 = 91 - 60i\]
   \[(-1)\]

3. \((2+i\sqrt{7})(10+i\sqrt{7})\)
   \[20 + 2i\sqrt{7} + 10i\sqrt{7} + i^2(7)\]
   \[13 + 12i\sqrt{7}\]
4. \[
\frac{5+i}{4-i} \cdot \frac{4+i}{4+i} = \frac{20+5i+4i+i^2}{16-i^2} = \frac{19+9i}{17} \text{ or } \frac{19}{17} + \frac{9}{17}i.
\]

5. \[
\frac{10-3i}{11+4i} \cdot \frac{11-4i}{11-4i} = \frac{110-40i-33i+12i^2}{121-i^2} = \frac{98-73i}{137} \text{ or } \frac{98}{137} - \frac{73}{137}i.
\]