1. You earned ____ points out of 10.
   Ans: 1

Simplify: \[ \sqrt{25 - 9 \div 2^2 \cdot 3} \]
\[ \left| 3 - 12 \div 2 \cdot 3 \right| - 12 \]

Follow the order of operations:
\[
\begin{align*}
\sqrt{25 - 9 \div 2^2 \cdot 3} &= \sqrt{16 \div 2^2 \cdot 3} = \frac{4 \div 4 \cdot 3}{3 - 12 \div 2 \cdot 3} = \frac{1 \cdot 3}{3 - 6 \cdot 3} = \frac{3 - 18}{15 - 12} = \frac{3}{3} = 1
\end{align*}
\]

2. You earned ____ points out of 10.
   Ans: Quotient: \( x^2 - x - 1 \)
   Remainder: 2 or \( \frac{2}{x + 1} \)

Find the quotient and remainder of \( x^3 - 2x + 1 \) divided by \( x + 1 \).

Write this as a long division problem:
\[
x + 1 \overline{\bigg| x^3 - 2x + 1}
\]

Putting in \( 0x^2 \) will help to keep like terms lined up.
\[
x + 1 \overline{\bigg| x^3 + 0x^2 - 2x + 1}
\]
\[ - \left( x^3 + x^2 \right) \]
\[ - x^2 - 2x \]
\[ - \left( -x^2 - x \right) \]
\[ - x + 1 \]
\[ - \left( -x - 1 \right) \]
\[ 2 \]
3. You earned ____ points out of 10.

   Factor completely: \(12x^3 + 10x^2 - 12x\)

   Factor out GCF = 2x
   \[= 2x(6x^2 + 5x - 6)\]

   \(ac = (6)(-6) = -36\) so possible pairs are 1•36, 2•18, 3•12, 4•9

   \(b = 5\) so pairs have to add or subtract to get 5.

   Use -4 and 9 (product is -36 and sum is 5)
   \[= 2x\left(\frac{6x^2 - 4x + 9x - 6}{5x}\right)\]

   Factor by grouping:
   \[= 2x\left(\frac{6x^2 - 4x + 9x - 6}{2x(3x-2)}\right)\]
   \[= 2x(3x - 2)(2x + 3)\]

   Note that the order makes no difference so we could have used
   \[= 2x\left(\frac{6x^2 + 9x - 4x - 6}{5x}\right)\]
   \[= 2x\left(\frac{6x^2 + 9x - 4x - 6}{3x(2x+3)}\right)\]
   \[= 2x(2x + 3)(3x - 2)\]

\[\textbf{Ans:} 2x(2x + 3)(3x - 2)\]

4. You earned ____ points out of 10.

   Solve: \(2 + \frac{1}{2}(x + 5) = \frac{x}{3} - (x - 1)\)

   To remove fractions, multiply each term by LCD = 6
   \[6 \cdot [2] + 6 \cdot \left[\frac{1}{2}(x + 5)\right] = 6 \cdot \left[\frac{x}{3}\right] - 6 \cdot (x - 1)\]
   \[12 + 3(x + 5) = 2x - 6x + 6\]
   \[12 + 3x + 15 = 2x - 6x + 6\]
   \[3x + 27 = -4x + 6\]
   \[7x = -21\]
   \[x = -3\]

\[\textbf{Ans:} x = -3\]
5. You earned ____ points out of 10.  

[7] Simplified Ans: \( \frac{x^2 - x - 1}{(x+1)(x-1)} \)

Simplify and write the domain using interval notation: [3] Domain: \(( -\infty, -1 ) \cup ( -1, 1 ) \cup ( 1, \infty )\)

\[
\frac{x}{x+1} - \frac{1}{x^2 - 1}
\]

\[
\frac{x}{x+1} - \frac{1}{(x+1)(x-1)}
\]

LCD is \((x+1)(x-1)\)

\[
= \frac{x \cdot (x-1) - 1}{(x+1)(x-1)}
\]

\[
= \frac{x^2 - x - 1}{(x+1)(x-1)}
\]

Cannot divide by 0 so \(x \neq 1, x \neq -1\)

\((-\infty, -1) \cup (-1, 1) \cup (1, \infty)\)

6. You earned ____ points out of 10.  

Ans: ______________________

Simplify and write your answer in \(a + bi\) form. \(\frac{i+1}{i-1} = \sqrt{-1} \cdot \sqrt{-25}\)

To get \(i\) out of denominator, multiply numerator and denominator of the fraction by the complex conjugate of the denominator.

To multiply the radicals, first convert them into imaginary numbers.

\[
\frac{i+1}{i-1} - \sqrt{-1} \cdot \sqrt{-25} = \frac{i+1}{i-1} \cdot \frac{i+1}{i+1} - \sqrt{1} \cdot \sqrt{25} i
\]

\[
= \frac{i^2 + i + i + 1}{i^2 + i - i - 1} - 1i \cdot 5i
\]

\[
= \frac{-1 + 2i + 1}{-1 - 1} - 5i^2
\]

\[
= \frac{2i}{-2} - 5(-1)
\]

\[
= -i + 5
\]

\[
= 5 + (-1)i \text{ or } 5 - i
\]
7. You earned ____ points out of 10.  
**Ans:** 0.9x

Calculate the area of the shape shown. It is a half circle on top of a rectangle. The radius of the circle is \( \frac{x}{2} \). The height of the rectangle is half its width. Use 3.14 for \( \pi \). Write your answer in terms of \( x \) with a decimal coefficient, rounded to one decimal place (e.g., 3.5x).

\[
A_{total} = A_{\text{half circle}} + A_{\text{rectangle}}
\]

\[
A_{\text{circle}} = \pi \cdot \text{radius}^2
\]

\[
= \pi \cdot \left( \frac{x}{2} \right)^2
\]

\[
= \frac{\pi}{4} x^2
\]

\[
A_{\text{half circle}} = \frac{1}{2} \cdot \frac{\pi}{4} x^2
\]

\[
= \frac{\pi}{8} x^2
\]

\[
A_{\text{rectangle}} = \text{Length} \cdot \text{Width}
\]

\[
= \frac{x}{2} \cdot x
\]

\[
= \frac{1}{2} x^2
\]

\[
A_{total} = A_{\text{half circle}} + A_{\text{rectangle}}
\]

\[
= \frac{\pi}{8} x^2 + \frac{1}{2} x^2
\]

\[
= 0.9x^2
\]