Solutions

Name: _____   _____ **/ 40**

Assessment 1 Instructions:

- The Assessment 1 is 10 problems and is worth 40 points. There is one *Extra Credit problem* which worth 4 points.

- You will have 1 hour to complete AS-1.

- The AS-1 is closed book and closed notes.

- Calculators are not allowed on the Assessment 1.

- Show all your work for full credit and box your final answer.

1. [4 points]

Simplify the exponential expression and write your answer with **only positive exponents**:

$$\left(\frac{25^0(x^{-1}y^3)^{-1}z^4}{x^2yz^{-2}}\right)^{-3} = \left(\frac{1\cdot x^1\cdot y^{-3}z^4}{x^2yz^{-2}}\right)^{-3} = \left(x^{-1}y^{-4}z^6\right)^{-3} =$$

$$= x^3y^{12}z^{-18} = \boxed{\frac{x^3y^{12}}{z^{18}}}$$

2. [4 points] Simplify the radical expression by rationalizing the denominator:

$$\frac{x}{\sqrt{x}-\sqrt{2}} = \frac{x(\sqrt{x}+\sqrt{2})}{(\sqrt{x}-\sqrt{2})(\sqrt{x}+\sqrt{2})} = \frac{x\sqrt{x}+\sqrt{2}x}{x-2}$$

3. [4 points] Simplify the rational expressions:

a. $\dfrac{x^2-4x+4}{x^2-4} = \dfrac{(x-2)^2}{(x-2)(x+2)} = \boxed{\dfrac{x-2}{x+2}}$

b. $\dfrac{3}{2n^2-5n-3} \div \dfrac{1}{2n+1} = \dfrac{3}{2n^2-5n-3}\cdot\dfrac{2n+1}{1} =$

$$= \frac{3\cdot(2n+1)}{(2n+1)(n-3)\cdot 1} = \boxed{\frac{3}{n-3}}$$

4. [4 points] Simplify the following complex expressions:

a. i^{30} $= i^{28} \cdot i^2 = 1 \cdot (-1) = \boxed{-1}$

b. $(3+i)(2-i)$ $= 6 - 3i + 2i - i^2 = 6 - i + 1 = \boxed{7-i}$

5. [4 points] Factor **completely** the polynomial expressions:

a. $x^3 - 27y^3$ $= x^3 - (3y)^3 = (x-3y)(x^2 + 3xy + 9y^2)$

b. $6z^3 + 5z^2 - 36z - 30$ $= 6z(z^2 - 6) + 5(z^2 - 6) = (6z+5)(z^2-6) =$

$$= (6z+5)(z-\sqrt{6})(z+\sqrt{6})$$

6. [4 points] Find the area of a circle ($A = \pi r^2$, where r is the radius of a circle) and state your final answer with including units cm^2:

$r = 7cm$

$A = \pi r^2 \implies A = \pi(7)^2 = \boxed{49\pi} \ (cm^2)$

7. [4 points] Find the solutions to the quadratic equation (use any of the methods which were considered in the class):

a. $2 + 11x = -5x^2$

$-5x^2 - 11x - 2 = 0$
$5x^2 + 11x + 2 = 0$
$(5x + 1)(x + 2) = 0$

$5x + 1 = 0$ or $x + 2 = 0$

$\boxed{x = -\frac{1}{5}}$ or $\boxed{x = -2}$

b. $(z - 11)^2 = 9$

$z - 11 = \pm 3 \implies z - 11 = -3$ or $z - 11 = 3$

$\boxed{z = 8}$ or $\boxed{z = 14}$

8. **[4 points]** Find solutions to the radical equation:

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

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

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

$\cancel{4}-x = \cancel{4} + 4x + x^2$

$x^2 + 5x = 0$

$x(x+5) = 0$

$\boxed{x = 0}$ or $x = \cancel{-5}$

Check:
- $\sqrt{4-0} - 0 = 2$
- $\sqrt{4+5} + 5 \neq 2$

9. **[4 points]** Find solutions to the rational equation:

$$\frac{n+7}{n+6} = \frac{3}{10}$$

$n \neq -6$

$\boxed{n = -\dfrac{52}{7}}$

$3(n+6) = 10(n+7)$

$3n + 18 = 10n + 70$

$7n = 18 - 70 = -52$

10. **[4 points]** Find solutions to the absolute value equation:

$$|4x - 4| - 40 = 0 \quad \Rightarrow \quad |4x-4| = 40$$

$4x - 4 = 40$ or $4x - 4 = -40$

$4x = 44$ or $4x = -36$

$\boxed{x = 11}$ $\boxed{x = -9}$

11. **[Extra credit, 4 points]** Solve the following quadratic-like equation:

$$(x-1)^2 + (x-1) - 12 = 0$$

Substitution: $x - 1 = t$

$t^2 + t - 12 = 0$

$(t+4)(t-3) = 0$

$t = -4$ or $t = 3$

Back to Substitution: $x - 1 = -4$ or $x - 1 = 3$

$\boxed{x = -3}$ or $\boxed{x = 4}$