

Assessment Instructions:

- The Assessment 1 is 10 problems and is worth 40 points. Each numbered problem will earn you a score of 1-4 based on your set up of the function, your use of course methods to solve and prove your solution and your statement of the solution.
- 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. Simplify the exponential expressions:

$$(a) \left(\frac{2h^{-3}j^0k^2}{2jh^3k^3j^4k^{-4}} \right)^2$$

$$(b) \frac{2yx^4z^3}{(4x^4y^0z^{-4})^2(2yx^{-1})}$$

$$(c) \frac{(m^3q^4)^{-2}}{q^2mp^{-1}(2m^5p^4)}$$

2. Simplify the radical expressions:

$$(a) 2\sqrt{80x^4y^2}$$

$$(b) \sqrt[3]{43a^5b^3c^8}$$

$$(c) \sqrt{5}(4 + \sqrt{5})$$

$$(d) \frac{2}{\sqrt{3} - 5}$$

$$(e) \frac{4\sqrt{7}}{\sqrt{14} + \sqrt{2}}$$

$$(f) \sqrt{\frac{3}{5}}$$

3. Simplify the rational expressions:

$$(a) \frac{2m^2 - 4m - 30}{m + 3}$$

$$(b) \frac{x+2}{x-3} - \frac{x-3}{x+5} - \frac{1}{x^2+2x-15}$$

$$(c) \frac{2p+1}{3p-2} \cdot \frac{3p^2-23p+14}{2p+1}$$

$$(d) \frac{3}{2n^2-5n-3} \div \frac{1}{2n+1}$$

4. Simplify the following complex expressions:

$$(a) \frac{10}{3-i}$$

$$(b) (-5i)^3$$

$$(c) i^{-25}$$

$$(d) (\sqrt{-8})(\sqrt{-2})$$

$$(d) (4-i)(2+i)$$

5. Factor the polynomial expressions:

$$(a) 27a^2 - 72a$$

$$(b) 8x^2 - 16x - 32$$

$$(c) x^2 - 9$$

$$(d) -6p^2 - 13p + 28$$

$$(e) 6x^3 + 5x^2 + 36x + 30$$

$$(f) 4p^2 + 4p - 35$$

$$(g) 45b^3 - 80b$$

$$(h) 20p^3 + 35p^2 + 8p + 14$$

6. Find the area of the trapezoids ($A = \frac{a+b}{2} \cdot h$, where a is a smaller base, b is a greater base and h is the height):

$$(a) a = 3.1cm, b = 9.3cm, h = 6.7cm$$

7. Find the area of the circle ($A = \pi r^2$, where r is the radius of a circle):

$$(a) r = 5cm$$

(b) $d = 10cm$, where d is a diameter

8. Find the solutions to the quadratic/quadratic-like equations (use any method which was considered in the class)

(a) $-8 = -6x - 14x^2$

(b) $2 + 11x = -5x^2$

(c) $-2b^2 - 20b + 90 = -3b^2$

(d) $6v^2 + 8v - 56 = 5v^2$

(e) $(y - 5)^2 - 11(y - 5) + 24 = 0$

9. Find solutions to the radical equations:

(a) $v = 7 + \sqrt{14 - 2v}$

(b) $\sqrt{54 - 2n} + 10 = 16$

(c) $n + 3 = \sqrt{4n + 8}$

(d) $\sqrt{b - 2} - 3 = -2$

10. Find solutions to the rational equations:

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

(b) $1 = \frac{1}{n} + \frac{3}{4n^2}$

(c) $\frac{r + 9}{r + 4} = \frac{3}{4}$

(d) $\frac{2x + 1}{x} = \frac{5}{x^2 - 2x} - 4$

(e) $\frac{p - 8}{4p} = \frac{8}{5}$

11. Find solutions to the absolute value equations:

(a) $|2x + 5| = -2$

(b) $|-x + 6| = 4$

1. (a)

$$\left(\frac{\cancel{2} h^{-3} j^0 k^2}{\cancel{2} j^3 k^3 j^4 k^{-4}} \right)^2 = \left(\frac{h^{-3} \cdot 1 \cdot k^2}{h^3 j^5 k^{-1}} \right)^2 = (h^{-6} j^{-5} k^3)^2 =$$

$$= h^{-12} j^{-10} k^6$$

(b)

$$\frac{2yx^4z^3}{(4x^4y^0z^{-4})^2 (2yx^{-1})} = \frac{\cancel{2} x^4 z^3}{16 \cdot \cancel{x^8} y^0 z^{-8} \cdot \cancel{2} \cdot y \cdot x^{-1}} =$$

$$= \frac{1}{16} \frac{x^4 z^3}{x^7 z^{-8}} = \frac{1}{16} \frac{z^{11}}{x^3}$$

(c)

$$\frac{(m^3 q^4)^{-2}}{q^2 m p^{-1} (2m^5 p^4)} = \frac{m^{-6} q^{-8}}{2 q^2 m^6 p^3} = \frac{m^{-12} q^{-10}}{2 p^3} =$$

$$= \frac{1}{2 m^{12} p^3 q^{10}}$$

2.

(a) $2 \sqrt{80x^4y^2} = 2 \sqrt{16 \cdot 5 x^4 y^2} = 8 \sqrt{5} x^2 y$

(b) $\sqrt[3]{43a^5b^3c^8} = \sqrt[3]{43} \cdot a \sqrt[3]{a^2} c \sqrt[3]{c^2} =$

$$= \sqrt[3]{43} a c \sqrt[3]{a^2 c^2}$$

(c) $\sqrt{5} (4 + \sqrt{5}) = 4\sqrt{5} + 5$

$$(d) \frac{2}{\sqrt{3}-5} = \frac{2(\sqrt{3}+5)}{(\sqrt{3}-5)(\sqrt{3}+5)} = \frac{2(\sqrt{3}+5)}{3-25} =$$

$$= \frac{2(\sqrt{3}+5)}{-22} = -\frac{(\sqrt{3}+5)}{11}$$

$$(e) \frac{4\sqrt{7}}{\sqrt{14} + \sqrt{2}} = \frac{4\sqrt{7}(\sqrt{14} - \sqrt{2})}{(\sqrt{14} + \sqrt{2})(\sqrt{14} - \sqrt{2})} =$$

$$= \frac{28\sqrt{2} - 4\sqrt{14}}{14 - 2} = \frac{28\sqrt{2} - 4\sqrt{14}}{12} = \frac{7\sqrt{2} - \sqrt{14}}{3}$$

$$(f) \sqrt{\frac{3}{5}} = \frac{\sqrt{3}}{\sqrt{5}} = \frac{\sqrt{15}}{5}$$

$$\boxed{3.} (a) \frac{2m^2 - 4m - 30}{m+3} = \frac{2(m^2 - 2m - 15)}{m+3} =$$

$$= \frac{2(m-5)(\cancel{m+3})}{\cancel{m+3}} = 2(m-5)$$

$$(d) \frac{3}{2n^2 - 5n - 3} : \frac{1}{2n+1} =$$

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

$$\boxed{4.} (a) \frac{10}{3-i} = \frac{10 \cdot (3+i)}{(3-i)(3+i)} = \frac{30+10i}{9+1} = \frac{30+10i}{10} =$$

$$= 3+i$$

$$(b) \quad (-5i)^3 = -125i^3 = 125i$$

$$(c) \quad i^{-25} = \frac{1}{i^{25}} = \frac{1}{i^{24} \cdot i} = \frac{1}{i} = \frac{i}{-1} = -i$$

$$(d) \quad (\sqrt{8})(\sqrt{2}) = i\sqrt{8} \cdot i\sqrt{2} = i\sqrt{16} = 4i$$

$$(e) \quad (4-i)(2+i) = 8 + 2i + 1 = 9 + 2i$$

5.

$$(a) \quad 27a^2 - 72a = 9a(3a-8)$$

$$(b) \quad 8x^2 - 16x - 32 = 4(2x^2 - 4x - 8) = \\ = 8(x^2 - 2x - 4)$$

$$(c) \quad x^2 - 9 = (x-3)(x+3)$$

$$(e) \quad \underbrace{6x^3} + \underbrace{5x^2} + \underbrace{36x} + \underbrace{30} = 6x(x^2+6) + 5(x^2+6) = \\ = (x^2+6)(6x+5)$$

$$(f) \quad 4p^2 + 4p - 35 = (2p-7)(2p+5)$$

$$(g) \quad 45b^3 - 80b = 5b(9b^2 - 16) = \\ = 5b((3b)^2 - 4^2) = 5b(3b-4)(3b+4)$$

$$6. \quad A = \frac{a+b}{2} \cdot h$$

$$a = 3.1 \text{ cm}$$

$$b = 9.3 \text{ cm}$$

$$h = 6.7 \text{ cm}$$

$$\begin{aligned} A &= \frac{3.1 + 9.3}{2} \cdot 6.7 = \frac{12.4}{2} \cdot 6.7 = 6.2 \cdot 6.7 = \\ &= 41.54 \text{ (cm}^2\text{)} \end{aligned}$$

$$7. \quad A = \pi r^2$$

$$r = 5 \text{ cm}$$

$$A = \pi(5)^2 = 25\pi \text{ (cm}^2\text{)}$$

$$8.$$

$$-8 = -6x - 14x^2$$

$$-14x^2 - 6x + 8 = 0 \quad | :(-2)$$

$$7x^2 + 3x - 4 = 0$$

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

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

$$7x(x+1) - 4(x+1) = 0$$

$$(x+1)(7x-4) = 0$$

$$x = -1 \quad 7x = 4 \Rightarrow x = \frac{4}{7}$$

$$9. (a) \quad v = 7 + \sqrt{14 - 2v}$$

$$(\sqrt{14 - 2v})^2 = (v - 7)^2$$

$$14 - 2v = v^2 - 14v + 49$$

$$v^2 - 12v + 35 = 0$$

$$(v - 5)(v - 7) = 0$$

$$v_1 = 5 \quad \text{X} \quad v_2 = 7 \quad \checkmark$$

$$10. (c) \quad \frac{r+9}{r+4} = \frac{3}{4}$$

$$3(r+4) = 4(r+9)$$

$$3r + 12 = 4r + 36$$

$$r = 12 - 36 = -24$$

$$\boxed{r = -24}$$

$$(e) \quad \frac{p-8}{4p} = \frac{8}{5}$$

$$5(p-8) = 4p \cdot 8 = 32p$$

$$5p - 40 = 32p$$

$$32p - 5p = -40$$

$$27p = -40$$

$$p = -\frac{40}{27}$$

$$(b) \quad 1 = \frac{1}{n} + \frac{3}{4n^2}$$

$$1 - \frac{1}{n} = \frac{3}{4n^2}$$

$$\frac{n-1}{n} = \frac{3}{4n^2}$$

$$4n^2(n-1) = 3n$$

$$4n^3 - 4n^2 - 3n = 0$$

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

$$n=0 \quad \text{or} \quad 4n^2 - 4n - 3 = 0$$

$$(2n+1)(2n-3) = 0$$

$$n = -\frac{1}{2}, \quad n = \frac{3}{2}$$

$$\left\{0, -\frac{1}{2}, \frac{3}{2}\right\}$$

11.

$$(a) \quad |2x+5| = -2$$

$$2x+5 = -2$$

$$2x = -2-5$$

$$-(2x+5) = -2$$

$$2x+5 = 2$$

$$2x = -7$$

$$x = -\frac{7}{2}$$

$$2x = -3$$

$$x = -\frac{3}{2}$$