8. Evaluate $(1-i)^4$

$= (1-i)^2 (1-i)^2$

$= (-2i)(-2i)$

$= 4i^2 = 4(-1)$

$= -4$

$(1-i)^2$

$= (1-i)(1-i)$

$= 1 - i - i + i^2$

$= 1 - 2i - 1$

$= -2i$

B-1) Evaluate

$(1-2i)^3$

$= (1-2i)(1-2i)(1-2i)$

$= (1 - 2i - 2i + 4i^2)(1-2i)$

$= (1 - 4i - 4)(1-2i)$

$= (-3 - 4i)(1-2i)$

$= -3 + 6i - 4i + 8i^2 = -3 + 2i - 8$

$= -11 + 2i$

9. Simplify

$(\sqrt{a})^{\frac{4}{3}}$

$= \left(a^{\frac{1}{2}}\right)^{\frac{4}{3}} = a^{\frac{1}{2}\cdot\frac{4}{3}} = a^{\frac{2}{3}} = \left(\sqrt[3]{a}\right)^2$

10. Evaluate

$2\sqrt{-4} + 3\sqrt{-9} - 4\sqrt{4}$

$= 2(2i) + 3(3i) - 4(2)$

$= 4i + 9i - 8$

$= 13i - 8 \longrightarrow -8 + 13i$

(in $a+bi$)

Part I – Multiple Choices (4 points each)

1. The expression $(2a)^{-4}$ is equivalent to

1) $-8a^4$
2) $\frac{16}{a^4}$
3) $-\frac{2}{a^4}$
4) $\frac{1}{16a^4}$

$$\frac{1}{(2a)^4} = \frac{1}{2^4 a^4}$$

$$= \frac{1}{16a^4}$$

2. The expression $\frac{1}{7-\sqrt{11}}$ is equivalent to

1) $\frac{7+\sqrt{11}}{38}$
2) $\frac{7-\sqrt{11}}{38}$
3) $\frac{7+\sqrt{11}}{60}$
4) $\frac{7-\sqrt{11}}{60}$

$$\frac{1(7+\sqrt{11})}{(7-\sqrt{11})(7+\sqrt{11})} = \frac{7+\sqrt{11}}{7^2-(\sqrt{11})^2}$$

$$= \frac{7+\sqrt{11}}{49-11} = \frac{7+\sqrt{11}}{38}$$

3. The expression $\frac{a^2b^{-3}}{a^{-4}b^2}$ is equivalent to

1) $\frac{a^6}{b^5}$
2) $\frac{b^5}{a^6}$
3) $\frac{a^2}{b}$
4) $a^{-2}b^{-1}$

$$\frac{a^2\ a^4}{b^3\ b^2} = \frac{a^6}{b^5}$$

4. If $a = 3$ and $b = -2$, what is the value of the expression $\frac{a^{-2}}{b^{-3}}$?

1) $-\frac{9}{8}$
2) -1
3) $-\frac{8}{9}$
4) $\frac{8}{9}$

$$\frac{b^3}{a^2} = \frac{(-2)^3}{(3)^2}$$

$$= \frac{-8}{9}$$

5. The expression $(x^2-1)^{-\frac{2}{3}}$ is equivalent to

1) $\sqrt[3]{(x^2-1)^2}$

2) $\frac{1}{\sqrt[3]{(x^2-1)^2}}$

3) $\sqrt{(x^2-1)^3}$

4) $\frac{1}{\sqrt{(x^2-1)^3}}$

$$\frac{1}{(x^2-1)^{\frac{2}{3}}} = \frac{1}{\left(\sqrt[3]{x^2-1}\right)^2}$$

Part II – Free Response (8 points each)

6. What is $\left(2-3\sqrt{x}\right)^2$ when it is expanded?

$$(2-3\sqrt{x})(2-3\sqrt{x})$$

$$= 4-6\sqrt{x}-6\sqrt{x}+9x$$

$$= 4-12\sqrt{x}+9x$$

E11,

Show your work for full credits. (7 pts each)

1. Simplify: $\sqrt{8a^3b^5}$

$\sqrt{4 \cdot 2 \cdot a^2 \cdot a \cdot b^2 \cdot b^2 \cdot b} = 2ab^2\sqrt{2ab}$

2. Simplify: $\sqrt[3]{54a^6b^4}$

$= \sqrt[3]{2 \cdot 3^3 \cdot a^3 \cdot a^3 \cdot b^3 \cdot b}$

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

54
2 27
3 9
3 3

3. If $a > 0$, then $\sqrt{9a^2 + 16a^2}$ equals

1) $\sqrt{7a}$
2) $5\sqrt{a}$
3) $5a$
4) $7a$

$= \sqrt{25a^2}$

$= 5a$

4. Simplify and add.

$$\sqrt{18} + \sqrt{8} - \sqrt{3}$$

$= \sqrt{9}\sqrt{2} + \sqrt{4}\sqrt{2} - \sqrt{3}$

$= 3\sqrt{2} + 2\sqrt{2} - \sqrt{3}$

$= 5\sqrt{2} - \sqrt{3}$

5. Evaluate

$$(2-\sqrt{3})^2$$

$(2-\sqrt{3})(2-\sqrt{3})$

$= 4-2\sqrt{3}-2\sqrt{3}+3 = 7-4\sqrt{3}$