6E

1) $(7)^3 = 343$

2) $5^4 = 625$

3) $10^5 = 100{,}000$

4) $(-8)^2 = 64$

5) $(81^{1/2})^{1/2} = 81^{1/4} = 3$

6) $[\,(36)^{1/2}\,]^3 = 6^3 = 216$

7) $[\,(X^8)^{1/4}\,]^{1/2} = X^{8/8} = X$

8) $(1000^{1/3})^{-5} = 10^{-5} = \frac{1}{100\,000}$ or $\frac{1}{10^5}$

9) $(X - 2)(X - 2)$

10) $(X + 5)(X + 5)$

11) $(X - 6)(X - 6)$

12) $(3X - 1)(X + 5)$

13) $3X^2 + 15X - 42 = 0$
$3(X^2 + 5X - 14) = 0$
$3(X + 7)(X - 2) = 0$
$X = -7, 2$

$3(-7)^2 + 15(-7) - 42 = 0$
$147 - 105 - 42 = 0$ ✓

$3(2)^2 + 15(2) - 42 = 0$
$12 + 30 - 42 = 0$ ✓

14) $X^2 - X - 20 = 0$
$(X - 5)(X + 4) = 0$
$X = 5, -4$

$(5)^2 - (5) - 20 = 0$
$25 - 5 - 20 = 0$ ✓

$(-4)^2 - (-4) - 20 = 0$
$16 + 4 - 20 = 0$ ✓

15) $\frac{8(2X)}{3X(2X)} - \frac{2(3X)}{2X(3X)} - \frac{5}{6X^2} =$

$\frac{16X - 6X - 5}{6X^2} = \frac{10X - 5}{6X^2}$

16) $\frac{(X - 3)(X + 2)}{(X - 2)(X + 2)} - \frac{4X + 3}{X^2 - 4} - \frac{(X + 3)(X - 2)}{(X + 2)(X - 2)} =$

$\frac{X^2 - X - 6 - 4X - 3 - X^2 - X + 6}{X^2 - 4} =$

$\frac{-6X - 3}{X^2 - 4}$

17) $\frac{\frac{1}{9} - \frac{X(3)}{3(3)}}{\frac{X(2)}{12(2)} + \frac{5(3)}{8(3)}} = \frac{\frac{1 - 3X}{9} \cdot \frac{24^8}{2X^2 + 15}}{\frac{2X + 15}{24} \cdot \frac{24}{2X + 15}} =$

$\frac{8 - 24X}{6X + 45}$

18) $\frac{(X - 8)(X + 2)}{(X + 2)} \cdot \frac{(X - 4)}{(X - 4)(X - 4)} =$

$\frac{X - 8}{X - 4}$

19) $\frac{\sqrt{5}\,\sqrt{3}}{\sqrt{3}\,\sqrt{3}} = \frac{\sqrt{15}}{3}$

20) $\frac{1\sqrt{7}}{\sqrt{7}\,\sqrt{7}} - \frac{2\sqrt{2}}{\sqrt{8}\,\sqrt{2}} = \frac{\sqrt{7}}{7} - \frac{2\sqrt{2}}{4} =$

$\frac{\sqrt{7}\,(2)}{7\,(2)} - \frac{\sqrt{2}\,(7)}{2\,(7)} =$

$\frac{2\sqrt{7} - 7\sqrt{2}}{14}$

7A

1) i

2) $7i$

3) $8X^3i$

4) $\frac{11}{12}\,i$

5) $2i + 10i = 12i$

6) $2(3i) + 6 = 6i + 6$

7) $\sqrt{4X^2}\sqrt{5}\sqrt{-1} = 2Xi\sqrt{5}$

8) $i\sqrt{A} + i\sqrt{B}$

9) $3\sqrt{-1}\sqrt{4}\sqrt{3} + 4\sqrt{-1}\sqrt{81}\sqrt{2} = 6i\sqrt{3} + 36i\sqrt{2}$

10) $13i - 18i = -5i$

11) $10i + 4$

12) $X\sqrt{3} + 2i$

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

14) $i^8 = (i^2)(i^2)(i^2)(i^2) = (-1)(-1)(-1)(-1) = 1$

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

16) $i^9 = (i^2)(i^2)(i^2)(i^2)(i) = (-1)(-1)(-1)(-1)(i) = i$

17) $(-120)(i^2) = 120$

18) $3i(i)(13) = 3(i^2)(13) = -39$

19) $\sqrt{-1}\,\sqrt{-1}\,\sqrt{36} = 6i^2 = -6$

20) $2(15)(6)(2i) = 360i$

7B

1) $15i$

2) $11i$

3) $7A^2i$

4) $\frac{10}{5}\,i = 2i$

5) $8i - 4i = 4i$

6) $18 - 4i$

7) $\sqrt{-1}\sqrt{9X^8}\sqrt{5X^1} = 3X^4i\sqrt{5X}$

8) $XY^2i + XY^2$

9) $6\sqrt{-1}\sqrt{2}\sqrt{100} - 5\sqrt{25} = 68\sqrt{2}(10) - 5(5) =$
$60i\sqrt{2} - 25$

10) $4i\sqrt{2} + 10i\sqrt{2} = 14i\sqrt{2}$

11) $3Ai + 9Ai = 12Ai$

12) $X^2i + 4X^2i = 5X^2i$

13) $6(-1)(-1) = 6$

14) $i^{10} = (i^2)(i^2)(i^2)(i^2)(i^2) = (-1)(-1)(-1)(-1)(-1) = -1$

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

16) $i^8 = (i^2)(i^2)(i^2)(i^2) = (-1)(-1)(-1)(-1) = 1$

17) $50i^2 = -50$

18) $14i^2 = -14$

19) -75

20) $6(13i)(2)(9i) = 1404i^2 = -1404$

7C

1) $\sqrt{81}\sqrt{-1} = 9i$

2) $\sqrt{169}\sqrt{-1} = 13i$

3) $\sqrt{64X^2}\ -1 = 8Xi$

4) $\sqrt{\frac{16}{25}}\sqrt{-1} = \frac{4}{5}i$

5) $\sqrt{4}\sqrt{-1} + \sqrt{36}\sqrt{-1} =$
$2i + 6i = 8i$

6) $\sqrt{9}\sqrt{-1} + \sqrt{100} = 3i + 10$

7) $5\sqrt{4}\sqrt{2}\sqrt{-1} + 7\sqrt{121}\sqrt{2}\sqrt{-1} =$
$10i\sqrt{2} + 77i\sqrt{2} = 87i\sqrt{2}$

8) $-126i^2 = -126(-1) = 126$

9) $i^3 = i^2 \cdot i = -1i = -i$

10) $(4 \cdot 14i)(3 \cdot 7) = 1{,}176i$

11) $(5)^2(5)^3 = 5^5$

12) $(X^{4/3})(X^{4/3}) = X^{8/3}$

13) $(10{,}000^{1/4})^3 = (10)^3 = 1{,}000$

14) $[\,(X^4)^{1/2}\,]^{1/3} = (X^2)^{1/3} = X^{2/3}$

15) $2X^2 + 9X - 11 = 0$
$(2X + 11)(X - 1) = 0$
$X = -11/2 \quad X = 1$

$2(-11/2)^2 + 9(-11/2) - 11 = 0$
$121/2 - 99/2 - 22/2 = 0$ ✓
$2(1)^2 + 9(1) - 11 = 0$
$2 + 9 - 11 = 0$ ✓

16) $[1/4X^2 - 9 = 0] \times 4$
$X^2 - 36 = 0$
$(X - 6)(X + 6) = 0$
$X = 6 \quad X = -6$

$1/4(6)^2 - 9 = 0$
$9 - 9 = 0$ ✓
$1/4(-6)^2 - 9 = 0$
$9 - 9 = 0$ ✓

17) $\frac{2X^2}{X^2 - 16} \div \frac{X}{4 - X} =$

$\frac{2X^{\cancel{2}}}{\cancel{(X-4)}(X+4)} \cdot \frac{-\cancel{(X-4)}}{\cancel{X}} = \frac{-2X}{X+4}$

18) $\sqrt{\frac{4}{5}} - \sqrt{\frac{1}{2}} = \frac{2}{\sqrt{5}} - \frac{1}{\sqrt{2}} =$
$\frac{2\sqrt{5}}{\sqrt{5}\sqrt{5}} - \frac{1\sqrt{2}}{\sqrt{2}\sqrt{2}} =$
$\frac{2\sqrt{5}(2)}{5(2)} - \frac{\sqrt{2}(5)}{2(5)} = \frac{4\sqrt{5} - 5\sqrt{2}}{10}$

19) $\frac{(\cancel{14}^{2} \times 10^2)(\cancel{21}^{3} \times 10^{-5})}{(\cancel{49}_{1} \times 10^{-2})} =$

$\frac{6 \times 10^{-3}}{1 \times 10^{-2}} = 6 \times 10^{-1}$

20) $\frac{X^3}{4Y^4} - \frac{9}{XY} + \frac{4X}{Y^2}$

7D

1) $\sqrt{16}\sqrt{-1} = 4i$

2) 12

3) $5X^2$

4) $\frac{4}{5}\,i$

5) $3i + 9i = 12i$

6) $4 + 6i$

7) $\sqrt{4}\sqrt{5} + 2\sqrt{9}\sqrt{5} = 2\sqrt{5} + 6\sqrt{5} = 8\sqrt{5}$

8) $-72i^2 = -72(-1) = 72$

9) $4i^2 = 4(-1) = -4$

10) $(7 \cdot 8i)(2 \cdot 9i) = 14 \cdot 72i^2 = -1008$

11) $(49)(4) = 196$

12) $(10)(10)^2 = 1{,}000$

13) $(90)^{-1} = \frac{1}{90}$

14) $[\,(32)^{1/5}\,]^{1/2} = 2^{1/2}$ or $\sqrt{2}$

15) $[1/9\,X^2 + 25/9 = 10/9\,X] \times 9$
$X^2 + 25 = 10X$
$X^2 - 10X + 25 = 0$
$(X - 5)(X - 5) = 0$
$X = 5$

$(5)^2 - 10(5) + 25 = 0$
$25 - 50 + 25 = 0$ ✓

16) $2(4X^2 - 20 + 25) = 0$
$2(2X - 5)(2X - 5) = 0$
$X = 5/2$

$4(5/2)^2 - 20(5/2) + 25 = 0$
$25 - 50 + 25 = 0$ ✓

17) $\frac{X - 5}{X^2 - 10X + 25} \div \frac{X + 6}{X^2 - 3X - 10} =$

$\frac{\cancel{X-5}}{\cancel{(X-5)}(X-5)} \cdot \frac{\cancel{(X-5)}(X+2)}{X+6} = \frac{X+2}{X+6}$

18) $\sqrt{\frac{2}{3}} - \sqrt{\frac{3}{5}} = \frac{\sqrt{2}\sqrt{3}}{\sqrt{3}\sqrt{3}} - \frac{\sqrt{3}\sqrt{5}}{\sqrt{5}\sqrt{5}} =$
$\frac{5\sqrt{6}}{(5)3} - \frac{3\sqrt{5}}{(3)5} = \frac{5\sqrt{6} - 3\sqrt{15}}{15}$

19) $(3 \times 10^{-2})(6 \times 10^{7})(4 \times 10^{2}) =$
$72 \times 10^{7} = 7.2 \times 10^{8}$

20) $3XA - 7XA - 5XA = -9XA$

7E

1) $2i$

2) $11i$

3) Xi

4) $\frac{9}{2}\,i$

5) $4i + 5$

6) $9i + i = 10i$

7) $5\sqrt{4}\,\sqrt{3}\,\sqrt{-1} + 7\sqrt{25}\,\sqrt{3}\sqrt{-1} =$

$10i\sqrt{3} + 35i\sqrt{3} = 45i\sqrt{3}$

8) $200i^3 = 200(i^2)(i) = -200i$

9) $3i^4 = 3i^2\,i^2 = 3(-i)(-i) = 3$

10) $(6 \cdot 5)(5\sqrt{16}\,\sqrt{-1}\,) = (30)(20)i = 600i$

11) $(X^2)(X^4) = X^6$

12) $(1)^2(X)^{1/3} = X^{1/3}$

13) $(2)^{-2} = \frac{1}{2^2} = \frac{1}{4}$

14) $[\,(64)^{1/2}\,]^{1/3} = 8^{1/3} = 2$

15) $[4/25X^2 = 1] \times 25$

$4X^2 = 25$

$4X^2 - 25 = 0$

$(2X - 5)(2X + 5) = 0$

$X = 5/2 \quad X = -5/2$

$4(5/2)^2 - 25 = 0$

$25 - 25 = 0$ ✓

$4(-5/2)^2 - 25 = 0$

$25 - 25 = 0$ ✓

16) $[9/4X^2 - 4 = 0] \times 4$

$9X^2 - 16 = 0$

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

$X = 4/3 \quad X = -4/3$

$9(4/3)^2 - 16 = 0$

$16 - 16 = 0$ ✓

$9(-4/3)^2 - 16 = 0$

$16 - 16 = 0$ ✓

17) $\frac{2X^2 + 2X - 4}{5X - 5} \div \frac{6X^2 - 6X - 36}{3X + 15} =$

$\frac{2(X + 2)(X - 1)}{5(X - 1)} \cdot \frac{3(X + 5)}{6(X - 3)(X + 2)} =$

$\frac{X + 5}{5X - 15}$

18) $\sqrt{\frac{4}{7}} - \sqrt{\frac{1}{4}} = \frac{\sqrt{4}}{\sqrt{7}} - \frac{\sqrt{1}}{\sqrt{4}} =$

$\frac{2\sqrt{7}}{\sqrt{7}\sqrt{7}} - \frac{1}{2} =$

$\frac{2\sqrt{7}(2)}{7(2)} - \frac{1(7)}{2(7)} = \frac{4\sqrt{7} - 7}{14}$

19) $\frac{(7 \times 10^{-7})(18 \times 10^{-4})}{(3 \times 10^{3})} =$

$\frac{42 \times 10^{-11}}{1 \times 10^{3}} = 42 \times 10^{-14} = 4.2 \times 10^{-13}$

20) $-\frac{4X}{A} - \frac{X}{A} + \frac{5}{A^2X} = \frac{-5X}{A} + \frac{5}{A^2X}$

8A

1) $A - B$

2) $3X + 8$

3) $6 - \sqrt{2}$

4) $1 + 5i$

5) $4B^2 - 16$

6) $9 - 4i^2 = 9 + 4 = 13$

7) $4 - 49i^2 = 4 + 49 = 53$

8) $16 - 7 = 9$

9) $\frac{X(3 - 4i)}{(3 + 4i)(3 - 41)} = \frac{3X - 4Xi}{9 - 16i^2} =$

$\frac{3X - 4Xi}{9 + 16} = \frac{3X - 4Xi}{25}$

10) $\frac{11(2 - i)}{(2 + i)(2 - i)} = \frac{22 - 11i}{4 + 1} =$

$\frac{22 - 11i}{5}$

11) $\frac{4i(6 + 3i)}{(6 - 3i)(6 + 3i)} = \frac{24i + 12i^2}{36 + 9} =$

$\frac{8(8i - 4)}{45} = \frac{8i - 4}{15}$

12) $\frac{i^2(4 - 5i)}{(4 + 5i)(4 - 5i)} = \frac{4i^2 - 5i^3}{16 - 25i^2} =$

$\frac{-4 + 5i}{41}$

13) $\frac{Z}{(Z + \sqrt{5}\,)} \frac{(Z - \sqrt{5}\,)}{(Z - \sqrt{5}\,)} = \frac{Z^2 - Z\sqrt{5}}{Z^2 - 5}$

14) $\frac{8(8 + \sqrt{8}\,)}{(8 - \sqrt{8}\,)(8 + \sqrt{8}\,)} = \frac{64 + 8\sqrt{4(2)}}{64 - 8} =$

$\frac{64 + 16\sqrt{2}}{56} = \frac{8 + 2\sqrt{2}}{7}$

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

$\frac{2(7X + 7X\sqrt{X})}{2(2 - 2X)} = \frac{7X + 7X\sqrt{X}}{2 - 2X}$

16) $\frac{3(8i - i\sqrt{2}\,)}{(8i + i\sqrt{2}\,)(8i - i\sqrt{2}\,)} = \frac{24i - 3i\sqrt{2}}{64i^2 - 2i^2} =$

$\frac{24i - 3i\sqrt{2}}{-64 + 2} = \frac{24i - 3i\sqrt{2}}{-62}$