Unit 4 Review KEY

① $\sqrt{-4} = \sqrt{-1}\cdot\sqrt{4}$
$= i\cdot 2$
$= \boxed{2i}$

② $-\sqrt{-20} = -\sqrt{-1}\cdot\sqrt{20}$
$= -i\cdot 2\sqrt{5}$
$= \boxed{-2i\sqrt{5}}$

20 → 4 · 5 → 2 · 2

③ $\sqrt{-\frac{2}{5}} = \sqrt{-1}\cdot\sqrt{\frac{2}{5}}$
$= \boxed{i\sqrt{\frac{2}{5}}}$

④ $\sqrt{\frac{-9}{25}} = \sqrt{-1}\cdot\sqrt{\frac{9}{25}}$
$= i\cdot\frac{3}{5}$
$= \boxed{\frac{3}{5}i}$

⑤ $(13+2i)+(-4-5i)$
$\boxed{9-3i}$

⑥ $(3+2i)-(5+4i)$
$3+2i-5-4i$
$\boxed{-2-2i}$

⑦ $(1+6i)(4-3i)$
$4-3i+24i-18i^2$
$4-3i+24i-18(-1)$
$\boxed{22+21i}$

⑧ $i^{26} = \boxed{-1}$

i	R1
-1	R2
$-i$	R3
1	R0

⑨ $i^{315} = \boxed{-i}$

⑩ $i^{56} = \boxed{1}$

⑪ $i^{95} = \boxed{-i}$

$315 \div 4 = 78$ R 3 ($4)\overline{315}$, -28, 35, -32, 3)

$56 \div 4 = 14$ ($4)\overline{56}$, -4, 16, -16, 0)

$95 \div 4 = 23$ ($4)\overline{95}$, 8, 15, -12, 3)

⑫ $x^2+64 \Rightarrow$ SOS $a^2+b^2=(a+bi)(a-bi)$
$\boxed{(x+8i)(x-8i)}$

⑬ $27x^3-64 \Rightarrow$ DOC $a^3-b^3=(a-b)(a^2+ab+b^2)$
$\boxed{(3x-4)(9x^2+12x+16)}$

⑭ $1+512y^3 \Rightarrow$ SOC $a^3+b^3=(a+b)(a^2-ab+b^2)$
$\boxed{(1+8y)(1-8y+64y^2)}$

⑮ $16x^2+8x+1 \Rightarrow$ PST $a^2+2ab+b^2=(a+b)^2$
$\boxed{(4x+1)^2}$

⑯ $7x^3-2x^2-28x+8 \Rightarrow$ Grouping
$x^2(7x-2)-4(7x-2)$
$(7x-2)(x^2-4)$ DOS
$\boxed{(7x-2)(x+2)(x-2)}$

⑰ $x^4-11x^2+24 \Rightarrow$ QF

(24: −8, −3; −11)

$(x^2-8)(x^2-3)$
No, x^2+3 is not a factor of x^4-11x^2+24.

(18)
$$x-3\overline{)4x^4-7x^3-24x^2+31x-19}\quad 4x^3+5x^2-9x+4$$
$-(4x^4-12x^3)$ ↓
$5x^3-24x^2$
$-(5x^3-15x^2)$ ↓
$-9x^2+31x$
$-(-9x^2+27x)$ ↓
$4x-19$
$-(4x-12)$
-7

$\frac{4x^4}{x}$ $\frac{5x^3}{x}$ $\frac{-9x^2}{x}$ $\frac{4x}{4}$

The remainder is -7.

(19)
$$x-3\overline{)5x^4-15x^3+0x^2+6x-13}\quad 5x^3+0x^2+0x+6$$
$-(5x^4-15x^3)$ ↓ ↓
$0x^2+6x$
$-(0x^2+0x)$ ↓
$6x-13$
$-(6x-18)$
5

$\frac{5x^4}{x}$ $\frac{0x^2}{x}$ $\frac{6x}{x}$

The quotient is $5x^3+6$.

(20)
$$x^2-3x+2\overline{)3x^3+0x^2+4x+11}\quad 3x+9$$
$-(3x^3-9x^2+6x)$ ↓
$9x^2-2x+11$
$-(9x^2-27x+18)$
$25x-7$

$\frac{3x^3}{x^2}$ $\frac{9x^2}{x^2}$

$$3x+9+\frac{25x-7}{x^2-3x+2}$$

(21)
$$x^2+2x-1\overline{)2x^3+7x^2-4x+7}\quad 2x+3$$
$-(2x^3+4x^2-2x)$ ↓
$3x^2-2x+7$
$-(3x^2+6x-3)$
$-8x+10$

$\frac{2x^3}{x^2}$ $\frac{3x^2}{x^2}$

$$2x+3+\frac{-8x+10}{x^2+2x-1}$$

PROBLEM ATTIC QUESTIONS

(1) D $8a^3+c^3 \Rightarrow$ SOC
$(2a+c)(4a^2-2ac+c^2)$

(2) D x^3-x^2+3x-3 GRP
$x^2(x-1)+3(x-1)$
$(x-1)(x^2+3)$

(3) D
$$2x+7\overline{)2x^4+21x^3+35x^2-37x+46}\quad x^3+14x^2+7x$$
$-(2x^4+7x^3)$ ↓
$28x^3+35x^2$
$-(28x^3+21x^2)$ ↓
$14x^2-37x$
$-(14x^2+49x)$
$-$

$\frac{2x^4}{2x}$ $\frac{28x^3}{2x}$ $\frac{14x^2}{2x}$

(4) A
$$2x+1\overline{)6x^3-11x^2-47x-20}\quad 3x^2-7x-20$$
$-(6x^3+3x^2)$ ↓
$-14x^2-47x$
$-(-14x^2-7x)$ ↓
$-40x-20$
$-(-40x-20)$
0

$\frac{6x^3}{2x}$ $\frac{-14x^2}{2x}$ $\frac{-40x}{2x}$

5 B

$$x-1\overline{)\,x^3-3x^2-10x+24}\quad =\ x^2-2x-12$$

$-(x^3-x^2)$ ↓

$-2x^2-10x$

$-(-2x^2+2x)$ ↓

$-12x+24$

$-(-12x+12)$

12

$\frac{x^3}{x}$ $\frac{-2x^2}{x}$ $\frac{-12x}{x}$

The remainder is 12.

6 A

$i^{49} = \boxed{i}$ $\quad 49 \div 4 = 12$ R1

7 C

$x=1$ or $x=-8$

$y=3(1)+2$ $\quad y=3(-8)+2$

$y=5$ $\quad y=-22$

$(1,5)$ $\quad (-8,-22)$ are the solutions.

8 B

$y=3x^2+3$

$y=5-5x$

$5-5x=3x^2+3$

$0=3x^2+5x-2$

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

$3x-1=0$ $\quad x+2=0$

$x=\frac{1}{3}$ $\quad x=-2$

$(\frac{1}{3}, \frac{10}{3})$ $\quad (-2,15)$

$x=\frac{1}{3}$

$y=5-5(\frac{1}{3})$

$y=5-\frac{5}{3}$

$y=\frac{15-5}{3}=\frac{10}{3}$

$x=-2$

$y=5-5(-2)$

$y=5+10=15$

9 B

$d=\frac{1}{2}\cdot 32t^2$

$d=16t^2$

$100=16t^2$

$\sqrt{6.25}=\sqrt{t^2}$

$t=2.5$

10 C

initial height $\Rightarrow h(0)$

$h(0)=-16(0-5)^2+576$

$=-400+576$

$=176$

11 A

Look for the maximum point on the graph.

x – # of pairs shoes

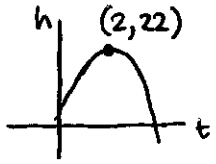
y – profit $\quad (60, 3100)$

12 D

$h=-5t^2+20t+2$

use 2nd trace 4: maximum in the calculator to find maximum.

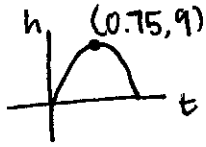
22 meters



13 B

$h=-16t^2+24t$

0.75 second



14 B

Enter data into L1 & L2

Stat ▶ [CALC] 5: QuadReg

$y=0.15x^2-0.74x+9.25$

15

$f(x)=5+7x-9x^2+4x^3$

$f(x)=4x^3-9x^2+7x+5$ ⇐ Standard form

$4x^3$ 1st term $\quad$ Positive LC $\quad$ ODD Degree: 3

End Behavior: As $x\to-\infty$, $y\to-\infty$; As $x\to\infty$, $y\to\infty$

16

$$x-4\overline{)\,x^3-3x^2-10x+24}\quad =\ x^2+x-6$$

$-(x^3-4x^2)$ ↓

x^2-10x

$-(x^2-4x)$

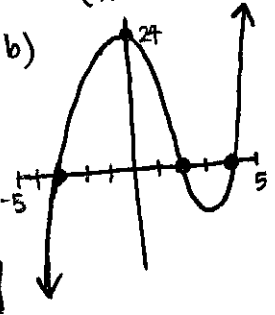
$-6x+24$

$-(-6x+24)$

0

x^2+x-6 factors to $(x+3)(x-2)$

b)



a) $P(x)=(x-4)(x+3)(x-2)$

(17) $m^2-25 \Rightarrow$ DOS

[C] $(m+5)(m-5)$

(18) $x+9$ is a factor so the remainder should be ZERO when performing long division.

(19) $162x^4-144x^2+32$

[D,F] $2(81x^4-72x^2+16)$ GCF = 2

$2(9x^2-4)^2$ PST

$2(3x+2)^2(3x-2)^2$ DOS

A doesn't have the right exponents
B too large first terms
C incorrectly factored PST
D ✓
E incorrect signs in binomials
F ✓

(20) x-intercepts @ $-5, -2, 1, 6$

Linear factors: $\boxed{x+5, x+2, x-1, x-6}$