Math Exersise

Class_____ No _____ Name _____

1 Simplify the expressions.

(1) $(2+3i)^4$

Ans. $-119-120i$

(2) $\left|\,|3-\pi|+3-\sqrt{10}\,\right|$

Ans. $-\pi+\sqrt{10}$

2 Expand the expressions.

(1) $(x-2y)^3$

Ans. $x^3-6x^2y+12xy^2-8y^3$

(2) $\left(\frac{3}{2}\alpha-\frac{5}{4}\beta+\frac{7}{6}\gamma\right)^2$

Ans. $\frac{9\alpha^2}{4}-\frac{15\alpha}{4}\beta+\frac{7\alpha}{2}\gamma+\frac{25\beta^2}{16}-\frac{35\beta}{12}\gamma+\frac{49\gamma^2}{36}$

(3) $(a+2)^{10}$

Ans. $a^{10}+20a^9+180a^8+960a^7+3360a^6+8064a^5+13440a^4+15360a^3+11520a^2+5120a+1024$

(4) $\sin 5\theta$

Ans. $16\sin^5(\theta)-20\sin^3(\theta)+5\sin(\theta)$

(5) $\log x^2y^3z^4$

Ans. $2\log(x)+3\log(y)+4\log(z)$

3 Factor the expressions.

(1) $6x^2-5xy-6y^2$

Ans. $(2x-3y)(3x+2y)$

(2) $ab(a+b)+bc(b+c)+ca(c+a)+2abc$

Ans. $(a+b)(a+c)(b+c)$

4 Solve for x the following equation and inequality.

(1) $3x^3-10x^2+17x-12=0$

Ans. $\left[\left(\frac{4}{3}\right),\quad\left(1-\sqrt{2}i\right),\quad\left(1+\sqrt{2}i\right)\right]$

(2) $x^2-3x-4\geqq 0$

Ans. $(-\infty,-1]\cup[4,\infty)$

5 Find the sum and the limit.

(1) $\sum_{k=1}^{n}k(k+1)^2$

Ans. $\frac{n}{12}(n+1)(n+2)(3n+5)$

(2) $\lim_{x\to\infty}x^2(x-\sqrt[3]{x^3+1})$

Ans. $-\frac{1}{3}$

6 Find the derivative.

(1) $\frac{d}{dx}(x^2\log x)$

Ans. $x(2\log(x)+1)$

(2) $\frac{d^3}{d\theta^3}(\theta\cos\theta)$

Ans. $\theta\sin(\theta)-3\cos(\theta)$

7 Find the indefinite integral and the definite integral.

(1) $\int e^x\sin x dx$

Ans. $-\frac{e^x}{2}(-\sin(x)+\cos(x))$

(2) $\int_{-1}^{\frac{3}{2}}(x+1)^2(2x-3)dx$

Ans. $-\frac{625}{96}$

8 Solve the recurrence relations.

(1) $a_{n+1}=3a_n+4,\ a_1=5$

Ans. $a_n=\frac{7}{3}3^n-2$

(2) $a_{n+2}-2a_{n+1}-8a_n=0,\ a_1=\frac{1}{2},\ a_2=3$

Ans. $a_n=\frac{(-2)^n}{12}+\frac{4^n}{6}$