

1.  $\arg(-\sqrt{3} - i)$

$$-5\pi/6 + 2k\pi$$

2. If  $z = (1+i)/(\sqrt{3} - i)$ , find  $\bar{z}$

$$z = \frac{(1+i)(\sqrt{3}+i)}{(\sqrt{3}-i)(\sqrt{3}+i)} = \frac{\sqrt{3}+i+i\sqrt{3}-1}{4} = \frac{\sqrt{3}-1+i(1+\sqrt{3})}{4}$$

$$\frac{\sqrt{3}-1}{4} - i\frac{1+\sqrt{3}}{4}$$

3. If  $\sin z = 0$ , find  $z$

$$z = n\pi, \text{ where } n \text{ is any integer}$$

4. The curve represented by  $z = 3t + it$  is  $y =$

$$x = 3t, \quad y = t \implies y = \frac{x}{3}$$

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

5. Principal value of  $\ln(1 + \sqrt{3}i)$

$$\ln(2) + i\frac{\pi}{3} + 2k\pi$$

6.  $1^{\sqrt{2}}$

$$\cos(2\sqrt{2}k\pi) + i\sin(2\sqrt{2}k\pi), k = 0, \pm 1, \pm 2$$

7.  $\oint_{|z-1|=1} \frac{\sin z}{z^2-z-12} dz$

$$0$$

8.  $\oint_{|z|=1} \frac{1}{z} dz$

$$0$$

9. Let  $f(z) = x^2 - iy$ , find points where it's differentiable  $f'(z) =$

$$-1$$

10. Let  $f(z) = (x^2 + 2xy) + i[1 - \sin(x^2 + y^2)]$ , find  $\lim_{z \rightarrow 1+i} f(z)$

$$3 + i(1 - \sin 2)$$

11. Solve  $z^3 - 8 = 0$

$$2, 2\left(-\frac{1}{2} + i\frac{\sqrt{3}}{2}\right), 2\left(-\frac{1}{2} - i\frac{\sqrt{3}}{2}\right)$$

12. Discuss the analyticity of  $f(z) = e^{\bar{z}}$  on the complex plane

$$\text{Not}$$

13. Let  $f(z) = mx^3 - nxy^2 + x + i(-y^3 + lx^2y + y)$  be analytic, find m, n, l

$$m = 1, n = 3, l = 3$$

14. Compute  $\int_L \operatorname{Re} z dz$ , where L is from 0 to  $1+i$

$$\frac{1+i}{2}$$

15. Compute  $\oint_C \frac{e^z}{z^3(z-1)} dz$

$$2\pi i \left( e - \frac{1}{2} \right)$$

16.  $f(z) = \int_C \frac{3\lambda^3 + 7\lambda^2 + 2\lambda + 1}{\lambda - z} d\lambda$ , find  $f'(1+i)$  and  $f'(2+2i)$

$$f'(1+i) = -64\pi + 32\pi i, f'(2+2i) = -200\pi + 60\pi i$$

17. Prove  $u(x, y) = x^2 - y^2$  is harmonic, find  $v(x, y)$  such that  $f(z) = u + iv$  is analytic and  $f(i) = 1$

$$v = 2xy + -2i$$