

1.
 - a) $i \sinh 2$
 - b) $\cos(1) \cosh(1) + i \sin(1) \sinh(1)$
 - c) $-\sinh(1)$
 - d) 0
 - e) $\text{Log} 2 + i\pi/6$
 - f) $\frac{1}{2}\text{Log} 2 + i(7\pi/4 + 2k\pi), k = 0, \pm 1, \pm 2, \dots$
 - g) $\exp(-2k\pi^2 + \pi i \text{Log} 2), k = 0, \pm 1, \pm 2, \dots$
 - h) $k\pi(-1)^{k+1}\text{Log}(1 + \sqrt{2}), k = 0, \pm 1, \pm 2, \dots$
2. a) $\pm \sqrt[4]{2} \exp(i\pi/8)$
 b) $\pi/2 + 2k\pi - i\text{Log}(2 \pm \sqrt{3}), k = 0, \pm 1, \pm 2, \dots$
3. a) $e^{-\pi}$
 b) $(1 + i) \exp[(i/2)\text{Log} 2 - \pi/4]$
4. For example, $z_1 = -1 + i, z_2 = i, \alpha = 1/2$.
5. $\mathbb{C} \setminus \{z = x + i | x \geq 4\}$ $f'(z) = -1/(4 + i - z)$
6. a) $\text{Log}(2z - 1)$
 b) $\mathcal{L}_0(2z - 1)$
 c) $\mathcal{L}_{\pi/2}(2z - 1)$.
7. a) $2 \cos(2z) \exp[\sin(2z)]$
 b) $3 \tan^2 z \sec^2 z$
 c) $(1 + i) \exp(-\pi/2)$
8. a) $i \exp[\frac{1}{2}\text{Log}(1 - z^2)]$
 b) $z \exp[\frac{1}{2}\text{Log}(4/z^2 + 1)]$
 c) $z^2 \exp[\frac{1}{2}\text{Log}(1 - 1/z^4)]$
 d) $z \exp[\frac{1}{3}\text{Log}(1 - 1/z^3)]$.