$$s'' + 2s' + 2s = 0$$

$s = e^{rt}$

$$r^2 + 2r + 2 = 0$$

$$r = \frac{-2 \pm \sqrt{4 - 4(1)(2)}}{2(1)} = \frac{-2 \pm \sqrt{-4}}{2} = \frac{-2 \pm 2i}{2}$$

$$= -1 \pm i$$

$$s = Ae^{r_1 t} + Be^{r_2 t}$$

$s(0)=2$
$s'(0)=0$

$$s = Ae^{(-1+i)t} + Be^{(-1-i)t}$$

$$s' = (-1+i)Ae^{(-1+i)t} + (-1-i)Be^{(-1-i)t}$$

$$2 = A + B$$
$$0 = (-1+i)A + (-1-i)B$$

$$2(-1+i) = (-1+i)A + (-1+i)B$$
$$-\left(0 = (-1+i)A + (-1-i)B\right)$$

$$-2+2i = (-1+i)B - (-1-i)B$$

$$-2+2i = -B + iB + B + Bi$$

$$-2+2i = 2iB$$

$$B = \left(\frac{-2+2i}{0+2i}\right)\left(\frac{0-2i}{0-2i}\right)$$

$$= \frac{4i+4}{4} = 1+i$$

$$A + B = 2$$
$$A + 1+i = 2$$
$$A = 1-i$$

$$s = (1-i)e^{(-1+i)t} + (1+i)e^{(-1-i)t}$$

$$s = (1-i)\, e^{-t} e^{it} + (1+i) e^{-t} e^{-it}$$

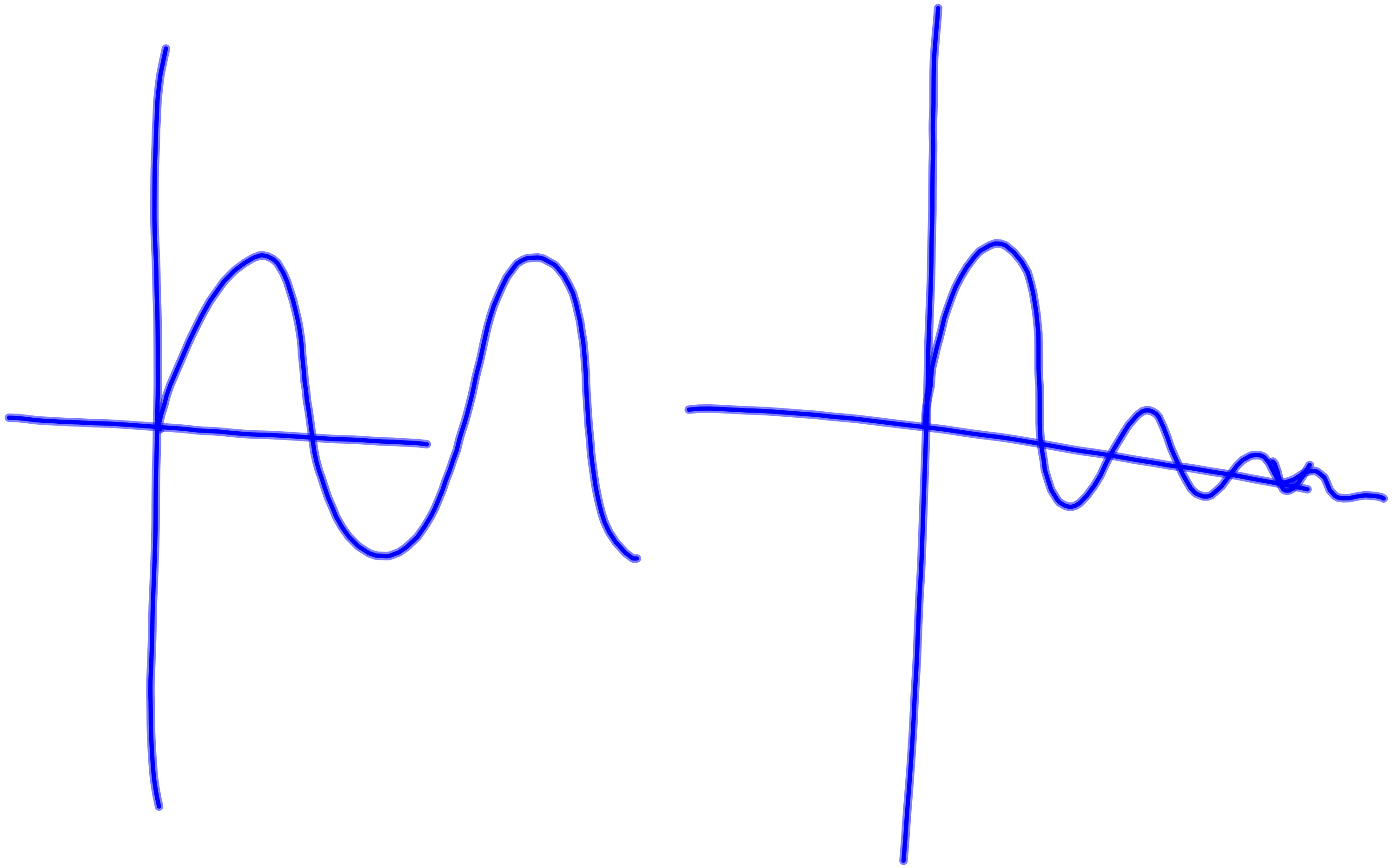
$$s = e^{-t}\left[(1-i)e^{it} + (1+i)e^{-it}\right]$$

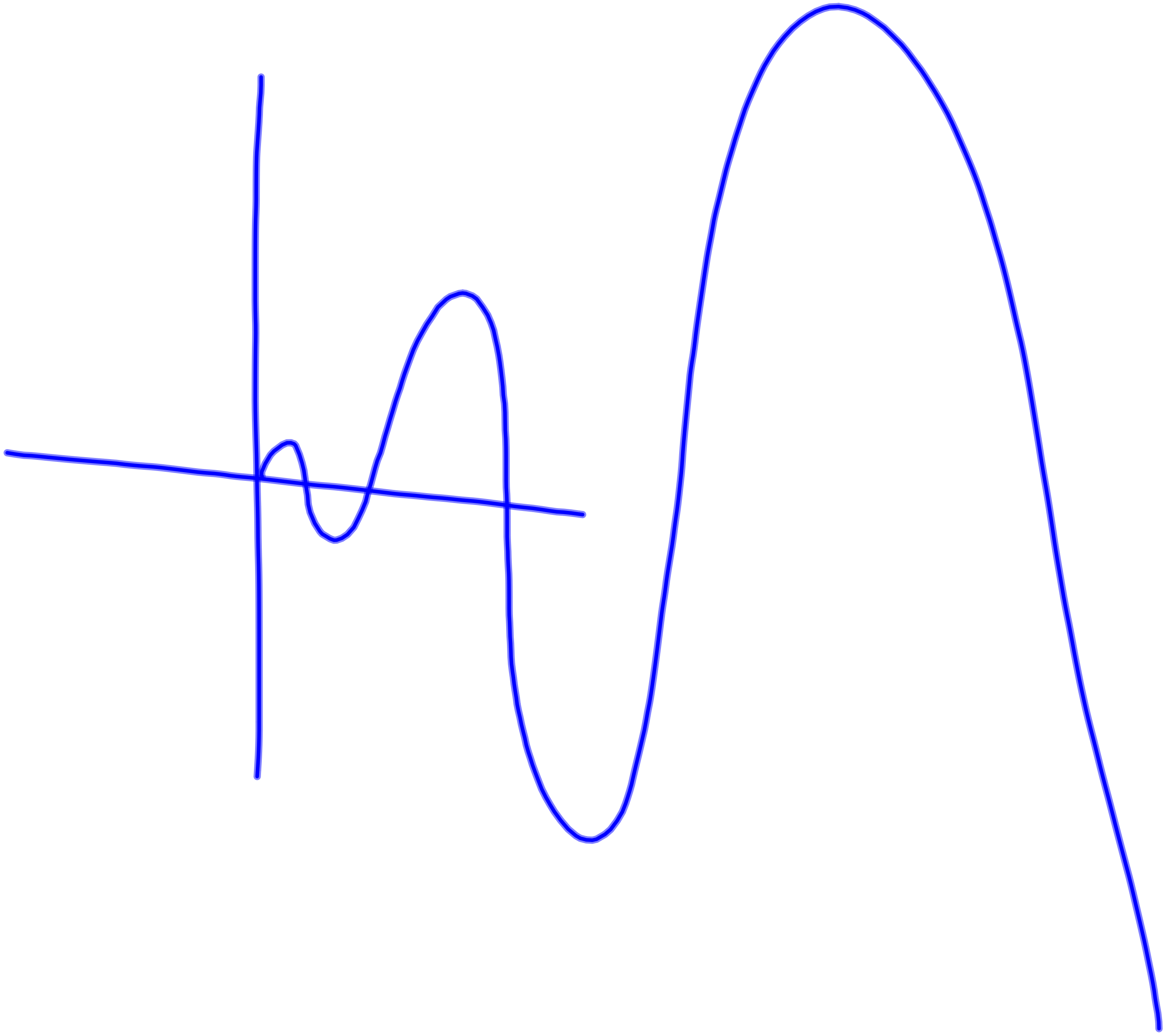
$$s = e^{-t}\left[(1-i)(\cos t + i\sin t) + (1+i)\left(\cos(-t) + i\sin(-t)\right)\right]$$

$$s = e^{-t}\left[(1-i)(\cos t + i\sin t) + (1+i)(\cos t - i\sin t)\right]$$

$$s = e^{-t}\left[\cos t + i\sin t - i\cos t + \sin t + \cos t - i\sin t + i\cos t + \sin t\right]$$

$$s = e^{-t}(2\cos t + 2\sin t)$$





$$as'' + bs' + cs = 0$$

$$ar^2 + br + c = 0$$

$$r = \alpha \pm \beta i$$

$$s = e^{\alpha t}\left(A\cos(\beta t) + B\sin(\beta t)\right)$$

$$s'' + 4s = 0$$

$$r^2 + 4 = 0$$

$s(0) = 1$
$s'(0) = 0$

$$r^2 = -4$$

$$r = 0 \pm 2i$$

$$s(t) = e^{0t}\left(A\cos(2t) + B\sin(2t)\right)$$

$$s = A\cos(2t) + B\sin(2t)$$

$$s' = -2A\sin(2t) + 2B\cos(2t)$$

$$1 = A\cos(0) + B\sin(0)$$

$$0 = -2A\sin(0) + 2B\cos(0)$$

$$s = \cos(2t)$$