1. Find the regions of convergence of these unilateral Laplace transforms.

(a) $X(s) = \dfrac{s-4}{(s+2)(s+8)}$, $\sigma = \mathrm{Re}(s) > -2$

Poles at $s = -2$ and $s = -8$. Therefore the ROC is $\sigma > -2$.

(b) $X(s) = \dfrac{s(s+1)}{s^2+s+4}$, $\sigma = \mathrm{Re}(s) > -0.5$

Poles at $s = -0.5 \pm j1.9365$. Therefore the ROC is $\sigma > -0.5$

2. Find the unilateral Laplace transform of

$$x(t) = -2\delta(t-6) \ .$$

$\delta(t) \overset{\mathcal{L}}{\longleftrightarrow} 1$, All s , $-2\delta(t) \overset{\mathcal{L}}{\longleftrightarrow} -2$, All s , $-2\delta(t-6) \overset{\mathcal{L}}{\longleftrightarrow} -2e^{-6s}$, All s

3. If the unilateral Laplace transform of $x(t) = e^{-5t}u(t)$ is $X(s)$, what are the numerical values of the magnitude and
angle of $X(j2)$?
$|X(j2)| = 0.1857$, $\angle X(j2) = -0.3805$ radians

$e^{-\alpha t}u(t) \overset{\mathcal{L}}{\longleftrightarrow} \dfrac{1}{s+\alpha}$, $\mathrm{Re}(s) > -\alpha$, $e^{-5t}u(t) \overset{\mathcal{L}}{\longleftrightarrow} \dfrac{1}{s+5}$, $\mathrm{Re}(s) > -5$

$X(s) = \dfrac{1}{s+5}$, $X(j2) = \dfrac{1}{j2+5} = \dfrac{5-j2}{25+4} = \dfrac{5}{29} - j\dfrac{2}{29} = 0.1858\angle -0.3805$