Serial # 0

- 1 points for not writing your serial number

King Fahd University of Petroleum & Minerals
Electrical Engineering Department
EE207: Signals and Systems (081)
Quiz 5: Fourier & Laplace Transforms

Name: KEY Ver.

1. A signal $x(t)= 4\cos(2t)$ is applied to a system which has the following transfer function $H(j\omega) = \frac{j\omega}{j\omega+1-\omega^2}$. Find the output $y(t)$.

Hint: the output will also be sinusoidal.

$\omega=2 \Rightarrow H(j\omega) = \frac{2j}{2j-3}$ ①

$\Rightarrow |H(j\omega)| = 0.555$ $\quad \angle H(j\omega) = 90^\circ - 146.3^\circ = -56.3^\circ$ ①

$y(t) = 4 * 0.555 \cos(2t - 56.3^\circ) = 2.22\cos(2t-56.3^\circ)$ ①

Note $\angle 2j-3 = 146.3^\circ$

while $\angle -2j+3 = -33.7^\circ$

$\frac{8}{\sqrt{13}}$

2. The following signal is passed through an ideal lowpass filter which blocks all frequencies above 4kHz, $x(t) = 2 + cos\ 3000t + 2cos\ (7000\pi t) + 3sin(12000\pi t)$

Find the power of the output signal

$x(t) = 2 + \cos\left(2\pi\left(\frac{3000}{2\pi}\right)t\right) + 2\cos(2\pi(3500)) + 3\sin(2\pi 6000t)$ ①

✓ ✓ ✓ ✗

Last term is the only term that does not pass $6000 > 4000$

output power $= (2)^2 + \frac{1^2}{2} + \frac{2^2}{2} = 4 + \frac{1}{2} + 2 = 6.5$ ① ①

3. Obtain the Laplace transform of the following signal. Laplace table attached

$$3u(t) + \delta(t-5) + e^{-5t+10}u(t-2)$$

$e^{-5(t-2)}u(t-2)$

$\frac{3}{s} + e^{-5s} + \frac{e^{-2s}}{s+5}$

① ① ②

Good Luck, **Dr. Ali Muqaibel**