Raymond Gallagher
Engineering 210
Quiz #12
Post-Mortem

Class,
Quiz #12 is done and finalized. All papers have been graded and returned to the Glennan labs. Please check blackboard for errors and contact me if there are any.

Solutions for quiz #12 are up on the website.

The average for quiz #12 is 13.4.

Problem 1:
Standard form for first-order transfer functions is requires the denominator to be in the form $1 + j\frac{\omega}{\omega_c}$. We accepted $\frac{K}{1 + j\frac{\omega}{\omega_c}}$ for low-pass filters and $\frac{j\omega K}{1 + j\frac{\omega}{\omega_c}}$ for high-pass filters. We also accepted the form $\frac{j\omega K}{j\omega + j\omega_c}$ in this case and a few similar, but may not be as lenient on the final.

Note the ω_c (cutoff frequency) in the formulas above! Once you get a transfer function into standard form, the cutoff frequency should just jump out at you.

NEVER, EVER, ***EVER*** give an answer that has both t and j (or i if that's what you use) in it. I emphasized it in recitation and it'll get another severe mention in the final review. DON'T DO IT. t is for (real) time-domain expressions. j is for (complex) phasor-domain expressions. The two don't mix.

Problem 2:
For the passband gain in deciBels---since it's a low-pass filter (as we know by looking at it in standard form, right?), the passband gain can be found by setting w=0, giving a passband gain of 2V/V. But that's not in dB. Taking 20log_10(2) gives the voltage gain in dB as approximately 6dB (fun fact: this is one of the dB properties listed in your book on page 564)

Whenever we ask you to graph frequency dependence like this, we're only expecting the straight-line approximation. Don't make it too hard on yourself. ;-)

The graphs overall seemed rather shoddy... since you get to define both axes, it would make sense to choose values that let you place the three relevant parts of the graph: The cutoff frequency (at a gain of approximately the passband gain); the passband (a horizontal portion at the passband gain); and the stopband, which should include a point showing that the curve is sloping down at -20dB/decade (in this case, using the point {2rad/sec,-14dB} would be a good choice).

If you haven't used a logarithmic graph before, the big space is usually drawn as being between 1*10^x and 2*10^x.