PROBLEM:

Circle the correct answer to each of these short answer questions:

1. Suppose that the discrete-time signal $x[n]$ is $x[n] = 8\cos(0.3\pi n - \pi/4)$ determine the frequency (in Hz) of the analog signal $y(t)$ that will be reconstructed by the ideal D-to-C converter operating at a sampling rate of 20 samples/second.

   (a) $f = 3$ Hz

   (b) $f = 6$ Hz

   (c) $f = 17$ Hz

   (d) $f = 34$ Hz

   (e) $f = 0.3$ Hz

   (f) $f = 0.15$ Hz

2. A signal $x(t)$ is defined by: $x(t) = \sum_{k=-50}^{50} k^2 e^{j2\pi kt}$. The Nyquist Rate for sampling $x(t)$ is

   (a) 1 Hz

   (b) 2 Hz

   (c) 25 Hz

   (d) 50 Hz

   (e) 100 Hz

3. For the following MATLAB code: `yy = firfilt( [0,1,2,0,-5], xx )` pick the correct difference equation for the filter being implemented.

   (a) $y[n] = \delta[n]$

   (b) $y[n] = x[n] + 2x[n-1] - 5x[n-2]$

   (c) $y[n] = x[n] + 2x[n-1] - 5x[n-3]$

   (d) $y[n] = x[n-1] + 2x[n-2] - 5x[n-3]$

   (e) $y[n] = x[n-1] + 2x[n-2] - 5x[n-4]$

4. If $\mathcal{H}(\hat{\omega})$ is the frequency response of a digital filter, and the input is $x[n] = 5 + 7\cos(0.3\pi n)$, then a concise way to define the output is:

   (a) $y[n] = \mathcal{H}(0.3\pi)(5 + 7\cos(0.3\pi n))$

   (b) $y[n] = \Re e\{5 + 7\mathcal{H}(0.3\pi)e^{j0.3\pi n}\}$

   (c) $y[n] = \Re e\{7\mathcal{H}(0.3\pi)e^{j0.3\pi n}\}$

   (d) $y[n] = \Re e\{5\mathcal{H}(0) + 7\mathcal{H}(0.3\pi)e^{j0.3\pi n}\}$

   (e) $y[n] = 5\mathcal{H}(0) + 7\mathcal{H}(0.3\pi)\cos(0.3\pi n)$