1. **A.** $2e^{j\pi/3} - \sqrt{6}e^{j\pi/4} = [2\cos(\pi/3) + j2\sin(\pi/3)] - [\sqrt{6}\cos(\pi/4) + j\sqrt{6}\sin(\pi/4)] = [1 + j\sqrt{3}] - [\sqrt{3} + j\sqrt{3}] = 1 - \sqrt{3}$. Add complex numbers in rectangular form.

2. **E.** $[\sqrt{3} + j] + [-\sqrt{3} + j] - 2j = 0$. Easier: draw diagram.

3. **B.** $(1 + j)e^{j\theta} = \sqrt{2}e^{j(\pi/4+\theta)} \rightarrow \theta = -\pi/4$ or $3\pi/4$. Multiply complex in polar form.

4. **C.** $M(x) = \frac{1}{2}\int_0^2 t\,dt = 1$.

5. **E.** $M(x^2) = \frac{1}{2}\int_0^2 t^2\,dt = 4/3$.

6. **C.** $C(x, x^2) = \int_0^2 (t)(t^2)dt = 4$.

7. **A.** Shift $[0, 2]$ by 1, then scale by 2. OR: Scale by 2 and shift by 1/2.

8. **D.** Least common multiple of 6 and 9 is 18. OR: GCD of $\frac{1}{6}$ and $\frac{1}{9}$ is $\frac{1}{18}$.

NOTE: **Accept E.** since 54 is "a period" according to course lecture notes.

9. **C.** $0.075 = 75/1000 = 3/40$ lowest terms$\rightarrow$period=denominator=40.

10. **C.** Converting to phasors$\rightarrow$ $2e^{j\pi/3} - \sqrt{6}e^{j\pi/4} + \sqrt{3}e^{j0} = 1$ (see #1).

11. **D.** Converting to phasors$\rightarrow$ $2e^{j\pi/6} + 2e^{j5\pi/6} + 3e^{-j\pi/2} = -j$ (see #2).

12. **D.** $\cos^2(7t) = \frac{1}{2} + \frac{1}{2}\cos(14t) \rightarrow 0, \pm 14$. Didn't have to remember trig. id.

13. **C.** by definition. Accept **B.** since course lecture notes wrong (p. 3a.20).

14. **E.** Using Parseval's thm., $4^2 + 3^2 + 5^2 + 3^2 + 4^2 = 75$.

15. **E.** Since 1 Hz=$2\pi > 2\ \frac{\text{RADIAN}}{\text{SECOND}}$, nothing gets removed.

16. **C.** $C(x_i, y_j) = 0$ for integers i, j from lab and lecture notes. Only C (0=0) true.

17. **A.** $X[0] = 0$ by inspection; A and only A is true.

18. **A.** $X[0] = 0$ by inspection; $X_[19] \neq 0$ easily found.

19. **E.** $x^*[n] = e^{-j2\pi nk/N}$. Only E. is true.

20. **B. Also accept D.** even though fundamental period is 50.

21. This was supposed to be $x(t)$ not $x[n]$. A few bright students noted that $x[n] = 13$!

22. $C(x, y) = \int_0^T e^{j2\pi(k-a)t/T}dt = \frac{T}{j2\pi(k-a)}[e^{j2\pi(k-a)} - 1] = 0$ only if $e^{j2\pi(k-a)} = 1$ $\rightarrow (k - a)$ is an integer$\rightarrow$ a is an integer.

EXAM SCORES BY LECTURE SECTION–SEE WHERE YOU STAND

#1: $100, 97, 96^5, 94, 92^4, 91^2, 88^3, 85^5, 84^4, 83, 82^2, 81^2, 80^6, 78, 77, 76^7, 72^2, 71, 69, 65^2, 64^2, 61$ $60, 59, 58^2, 57, 56^2, 55, 54^2, 53^3, 44, 43, 41, 28$. **Mean: 75.1. #:72.**

#2: $96^5, 94^2, 93, 92^5, 91, 90, 89^2, 88^3, 86^4, 85^3, 84^7, 82^5, 81^3, 80^5, 78^3, 77^3, 76^5, 75, 74, 72^5, 70^3$ $69, 67, 66, 64^3, 63^3, 62^3, 59, 58^2, 57^2, 55, 54, 53, 51, 50, 49, 47, 41$. **Mean: 76.4. #:93.**