HOMEWORK EXERCISES (TIME: 10 MINUTES)

21. Where $i^2 = -1$, $(2 + 5i)(3 - 7i)$ = ?

(A) $-29 + i$
(B) $29 + i$
(C) $29 + 29i$
(D) $41 + 29i$
(E) $41 + i$

22. If the solutions to $x^2 + bx + 1 = 0$ are complex numbers, which of the following could be the value of b?

(A) -4
(B) -2
(C) 1
(D) 2
(E) 3

23. The expression $\frac{2+3i}{3-i}$ (where $i^2 = -1$) is equivalent to which of the following expressions:

(A) $\frac{3+11i}{10}$
(B) $9 + 7i$
(C) $\frac{12+11i}{8}$
(D) $\frac{2-3i}{3}$
(E) $-\frac{7}{3}$

24. For the complex number i such that $i^2 = -1$, what is the value of $31i^{17} - 17i^{31}$?

(A) -48
(B) -14
(C) $14i$
(D) $48i$
(E) $-48i$

25. For $i^2 = -1$, which of the following is equivalent to i^{-1}?

(A) i
(B) $-i$
(C) 1
(D) -1
(E) $1 - i$

26. For real a and b and $i^2 = -1$, if $(a + bi)^2$ is a real number, then:

(A) $a = 0$ only
(B) $b = 0$ only
(C) $a = b$
(D) $a = 0$ or $b = 0$
(E) $a = 0$ and $b = 0$

27. If the solution set for x of the equation $x^2 + kx + 13 = 0$ is $\{2 - 3i, 2 + 3i\}$, where $i^2 = -1$, then $k = ?$

(A) -9
(B) -4
(C) 2
(D) 4
(E) 6

28. If the product of complex numbers di and $a + bi$ is equal to $4 - 3i$, where a, b, and d are real and $i^2 = -1$, then $\frac{b}{a} = ?$

(A) $-\frac{4}{3}$
(B) $-\frac{3}{4}$
(C) $\frac{2}{3}$
(D) $\frac{3}{4}$
(E) $\frac{4}{3}$

29. If $(a + bi)^2 = -2i$, where $i^2 = -1$, then $ab = ?$

(A) -2
(B) $-\sqrt{2}$
(C) -1
(D) 1
(E) $\sqrt{2}$

30. If the solutions to $x^2 - 6x + 34 = 0$ are r and s, then $r^2 + s^2 = ?$

(A) -32
(B) 2
(C) 18
(D) 34
(E) 36