MAT 320 Quiz 1 Fall 2023

Quiz ID: MVX Name: _____

Answers:

1. ☐
2. ☐
3. ☐
4. ☐
5. ☐
6. ☐
7. ☐
8. ☐
9. ☐
10. ☐

Submit electronic answers at

http://azrael.digipen.edu/cgi-bin/MAT320quiz.pl

Test ID: MVX Name: _____

MAT 320 Quiz 1 Fall 2023

1. Factor the polynomial $p(x) = x^3 + 1$ into linear and quadratic factors. The quadratic factor is:

   a) $x^2 + x - 1$ b) $x^2 - x - 1$ c) $x^2 - x + 1$ d) $x^2 + x + 1$ e) $x^2 + 1$

2. Same polynomial $p(x)$ as in the previous question. Use the quadratic formula to find the two complex roots of the quadratic factor. One of them is:

   a) $-\frac{1}{2} - \frac{\sqrt{3}}{2}i$ b) $\frac{1}{2} - \frac{\sqrt{3}}{2}i$ c) $1 + \sqrt{3}i$ d) $\frac{1}{4} - \frac{\sqrt{3}}{4}i$ e) $\frac{1}{4} + \frac{\sqrt{3}}{4}i$

3. Let $q(x) = (x - (a + bi))(x - (a - bi))$ be a quadratic polynomial in factored form. Multiply out so that $q(x) = x^2 + c_1 x + c_0$. What is c_1?

   a) $-2bi$ b) $-2a$ c) $a^2 + b^2$ d) $a + bi$ e) $2a + 2bi$

4. Same polynomial $q(x)$ as in the previous question. What is c_0?

   a) $-2bi$ b) $-2a$ c) $a^2 + b^2$ d) $a + bi$ e) $2a + 2bi$

5. Let $f(t) = e^{i4\pi t}$ be a phasor defined for all real numbers t, where t represents time in seconds. What is the frequency of this phasor measured in Hz (cycles per second).

   a) 2π b) 2 c) $\frac{1}{2}$ d) 4 e) 4π

6. Same $f(t)$ as in the previous question. What is the (smallest positive) period of f?

   a) 2π b) 2 c) $\frac{1}{2}$ d) 4 e) 4π

7. Let $f_c(z)$ be a complex function $f : \mathbb{C} \to \mathbb{C}$ which multiples the input complex variable z by the constant complex number $c = a + bi$. Assume f rotates z by an angle 120 degrees, or $\frac{2}{3}\pi$ radians, counterclockwise, and use this to solve for c. What is the real part a?

   a) $-\frac{1}{2}$ b) 2 c) -1 d) $\frac{1}{2}$ e) 1

8. Same $f_c(z)$ as in the previous question. Find the Cartesian form for $f(e^{i\pi/3})$.

   a) $-\frac{1}{2} - \frac{\sqrt{3}}{2}i$ b) $-\frac{1}{2} + \frac{\sqrt{3}}{2}i$ c) -1 d) $\frac{1}{2} + \frac{\sqrt{3}}{2}i$ e) 1

9. Let $g(z) = \frac{1}{|z|}$ so that $g : \mathbb{C} \to \mathbb{R}$. Find $g(1 + i)$.

   a) $\frac{3}{2}$ b) $\frac{\sqrt{2}}{2}$ c) 1 d) $\frac{1}{2}$ e) $\sqrt{2}$

10. Same $g(z)$ as in the previous question. Find the maximum value of $g(z)$ for inputs $z = x + yi$ where $y = x - 1$.

    a) $\frac{3}{2}$ b) $\frac{\sqrt{2}}{2}$ c) 1 d) $\frac{1}{2}$ e) $\sqrt{2}$