

# Math 112 Practice Test 4

**MULTIPLE CHOICE.** Choose the one alternative that best completes the statement or answers the question.

Use long division to determine whether the binomial is a factor of  $f(x)$ .

1)  $f(x) = x^3 - 10x^2 + 31x - 30$ ;  $x - 5$

A) Yes

$r = 0$

B) No

1) A

2)  $f(x) = 3x^3 - 14x^2 - 19x + 70$ ;  $x + 4$

A) Yes

$r = -270$

B) No

2) B

Use synthetic division to find the quotient and the remainder.

3)  $(2x^3 + 3x^2 + 4x - 10) \div (x + 1)$

$$\begin{array}{r|rrrr} -1 & 2 & 3 & 4 & -10 \\ & & -2 & 1 & 3 \\ \hline & 2 & 1 & 3 & -7 \end{array}$$

A)  $Q(x) = (2x^2 + x + 3)$ ;  $R(x) = -13$

C)  $Q(x) = (2x^2 + x + 3)$ ;  $R(x) = 13$

B)  $Q(x) = (2x^2 + 5x + 9)$ ;  $R(x) = 1$

D)  $Q(x) = (2x^2 + 5x + 9)$ ;  $R(x) = -1$

3) A

4)  $(5x^3 + 2x^2 - x) \div (x + 2)$

$$\begin{array}{r|rrrr} -2 & 5 & 2 & -1 & 0 \\ & & -10 & 16 & -30 \\ \hline & 5 & -8 & 15 & -30 \end{array}$$

A)  $Q(x) = (5x^2 - 8x + 15)$ ;  $R(x) = -30$

C)  $Q(x) = (5x^2 + 12x + 23)$ ;  $R(x) = 46$

B)  $Q(x) = (5x^2 - 8x + 15)$ ;  $R(x) = 30$

D)  $Q(x) = (5x^2 + 8x - 17)$ ;  $R(x) = 34$

4) A

5)  $(x^3 - 3) \div (x - 1)$

$$\begin{array}{r|rrrr} 1 & 1 & 0 & 0 & -3 \\ & & 1 & 1 & -1 \\ \hline & 1 & 1 & 1 & -4 \end{array}$$

A)  $Q(x) = x^3 - x^2 - x - 1$ ;  $R(x) = 0$

C)  $Q(x) = x^2 - x - 1$ ;  $R(x) = 0$

B)  $Q(x) = x^2 + x + 1$ ;  $R(x) = 3$

D)  $Q(x) = x^2 + x + 1$ ;  $R(x) = -2$

5) D

Use synthetic division to find the function value.

6)  $f(x) = x^3 + 8$ ; find  $f(3 + i)$ .

A)  $18 + 26i$

B)  $26 + 27i$

C)  $26 + 26i$

D)  $18 + 27i$

6) C

Factor the polynomial  $f(x)$ . Then solve the equation  $f(x) = 0$ .

7)  $f(x) = x^3 - 12x^2 + 44x - 48$

$2, 4, 6$

A)  $(x - 2)(x - 4)(x - 7)$ ;  $2, 4, 7$

C)  $(x - 2)(x - 4)(x - 6)$ ;  $2, 4, 6$

B)  $(x - 2)(x + 4)(x - 6)$ ;  $-2, 4, -6$

D)  $(x + 2)(x - 4)(x + 6)$ ;  $-2, 4, -6$

7) C

8)  $f(x) = x^3 - 4x^2 - 9x + 36$

A)  $(x - 3)(x + 3)(x - 4)$ ;  $-3, 3, -4$

C)  $(x - 3)(x + 3)(x - 5)$ ;  $3, -3, 5$

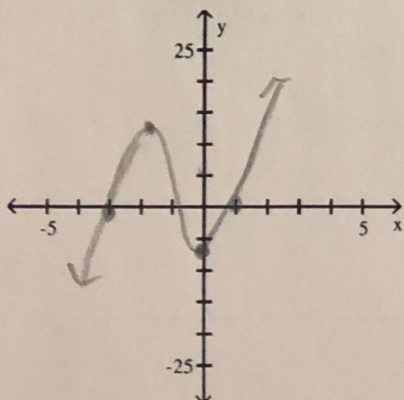
B)  $(x - 3)(x + 3)(x - 4)$ ;  $3, -3, 4$

D)  $(x + 3)(x - 3)(x + 4)$ ;  $-3, 3, -4$

8) A

Graph the polynomial function. Use synthetic division and the remainder theorem to find the zeros.

9)  $f(x) = 3x^3 + 8x^2 - 5x - 6$



$$\begin{array}{r|rrrr} -3 & 3 & 8 & -5 & -6 \\ & & -9 & 3 & 6 \\ \hline & 3 & -1 & -2 & 0 \end{array}$$

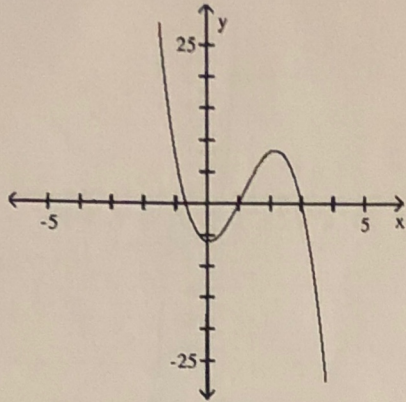
$$\begin{array}{r|rr} 1 & 3 & 2 \\ & & 0 \\ \hline & 3 & 2 \end{array}$$

$3x + 2 = 0$   
 $x = -2/3$

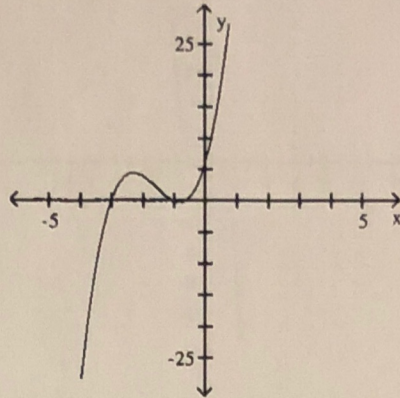
9) C

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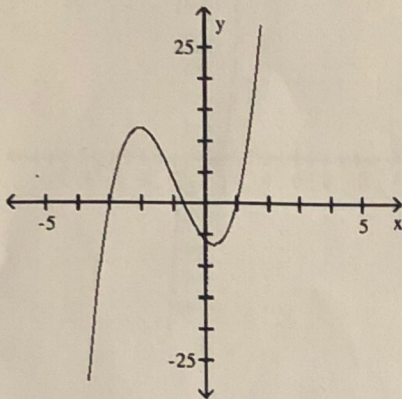
A)  $1, \frac{2}{3}, -3;$



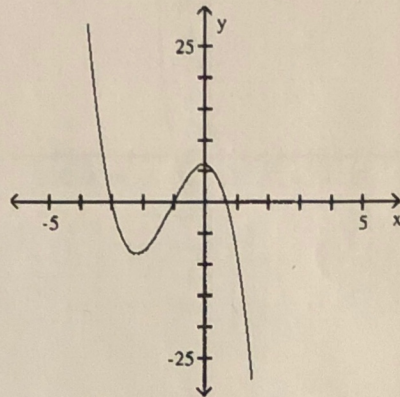
B)  $1, \frac{2}{3}, 3;$



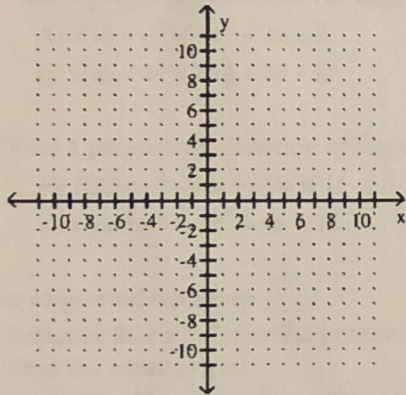
C)  $1, -\frac{2}{3}, -3;$



D)  $1, -\frac{2}{3}, 3;$



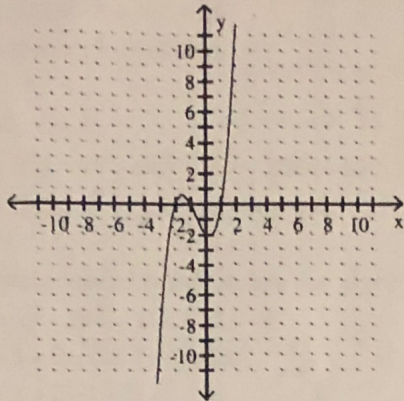
10)  $f(x) = x^3 + 2x^2 - x - 2$



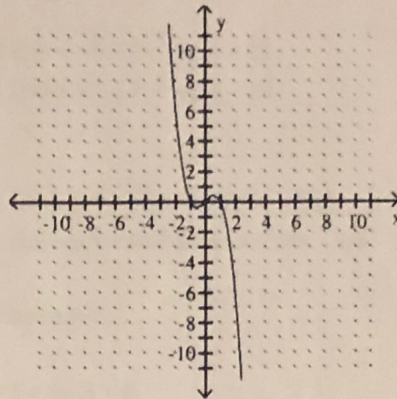
10) A

tb

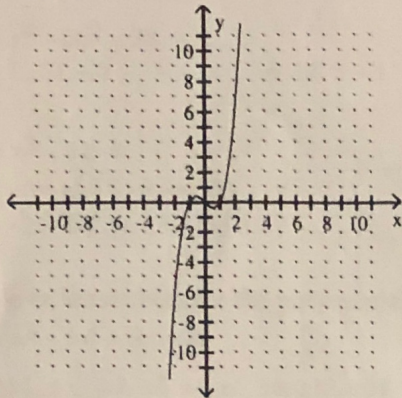
A) -2, -1, 1



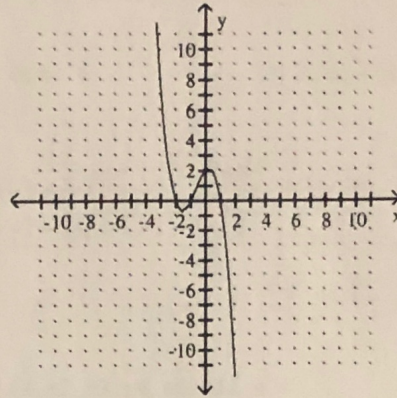
B) -1, 1, 2



C) -1, 0, 1



D) -2, -1, 1



Find the requested polynomial.

11) Find a polynomial function of degree 3 with -1, 2, 4 as zeros.

A)  $f(x) = x^3 - 5x^2 + 2x + 8$

B)  $f(x) = 3x^3 + 5x^2 + 2x - 8$

C)  $f(x) = x^3 + 7x^2 + 2x - 2$

D)  $f(x) = x^3 + 5x^2 + 2x - 8$

11) A

12) Find a polynomial function of degree 3 with 4, 2i, -2i as zeros.

A)  $f(x) = x^3 - 4ix^2 + 4x + 16$

B)  $f(x) = x^3 - 4x^2 - 4x + 16$

C)  $f(x) = x^3 - 4x^2 + 4x - 16$

D)  $f(x) = x^3 + 4x^2 + 4ix + 16i$

12) B

Provide the requested response.

13) Suppose that a polynomial function of degree 5 with rational coefficients has -3, 3i,  $-\sqrt{3}$  as zeros. Find the other zeros.

A) -3i,  $\sqrt{3}$

B) -3i,  $i + \sqrt{3}$

C)  $3 - i$ ,  $-3 + \sqrt{3}$

D)  $3 - i$ ,  $\sqrt{3}$

13) A

14) Suppose that a polynomial function of degree 4 with rational coefficients has 6,  $4\sqrt{2}$  as zeros. Find the other zero.

A) -6

B)  $-\sqrt{2}$

C)  $i + \sqrt{2}$

D)  $\sqrt{2}i$

14) B

17

Find a polynomial function of lowest degree with rational coefficients that has the given numbers as some of its zeros.

15)  $-3i, 2$

A)  $f(x) = x^4 + 5x^2 - 36$

C)  $f(x) = x^4 - 5x^2 + 36$

B)  $f(x) = x^3 - 3x^2 + 9x + 18$

D)  $f(x) = x^3 - 2x^2 + 9x - 18$

15) D

16)  $2, -10, 4 + 4i$

A)  $f(x) = x^4 - 6x^3 - 8x^2 + 208x - 640$

C)  $f(x) = x^4 - 52x^2 + 416x - 640$

B)  $f(x) = x^4 - 104x^2 + 416x - 640$

D)  $f(x) = x^4 - 6x^3 + 8x^2 - 208x + 640$

16) C

Given that the polynomial function has the given zero, find the other zeros.

17)  $f(x) = x^3 - 2x^2 - 11x + 52; -4$

A)  $1 + 2\sqrt{13}i, 1 - 2\sqrt{13}i$

C)  $1 + 2i, 1 - 2i$

B)  $3 + 4i, 3 - 4i$

D)  $3 + 2i, 3 - 2i$

17) D

18)  $f(x) = x^4 - 5x^2 - 36; -2i$

A)  $2i, 3i, -3i$

B)  $2i, 3, -3$

C)  $2i, 6, -6$

D)  $2i, 6i, -6i$

18) B

19)  $f(x) = x^3 - 64; 4$

A)  $-2 + \sqrt{3}i, -2 - \sqrt{3}i$

C)  $-2 + 4\sqrt{3}i, -2 - 4\sqrt{3}i$

B)  $-2 + 2\sqrt{3}i, -2 - 2\sqrt{3}i$

D)  $-1 + 2\sqrt{3}i, -1 - 2\sqrt{3}i$

19) B

Give all possible rational zeros for the polynomial.

20)  $f(x) = x^3 - 6x^2 + 3x - 24$

A)  $\pm 1, \pm \frac{1}{2}, \pm 2, \pm 3, \pm 4, \pm 6, \pm 8, \pm 12, \pm 24$

C)  $\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 8, \pm 12, \pm 24$

B)  $\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12, \pm 24$

D)  $\pm 1, \pm 2, \pm 3, \pm 4, \pm 24$

20) C

21)  $f(x) = 3x^3 + 55x^2 + 55x + 27$

A)  $\pm 1, \pm 3, \pm 9, \pm 27$

C)  $\pm 1, \pm \frac{1}{3}, \pm 3, \pm 9, \pm 27$

B)  $\pm 1, \pm 3, \pm 6, \pm 9, \pm 27$

D)  $\pm 1, \pm \frac{1}{3}, \pm \frac{1}{9}, \pm \frac{1}{27}, \pm 3$

21) C

22)  $f(x) = 13x^{24} + 23x^{18} + 2x - 26$

A)  $\pm 1, \pm 2, \pm 13, \pm 26$

C)  $\pm 1, \pm \frac{1}{13}, \pm 2, \pm \frac{2}{13}, \pm 13, \pm 26$

B)  $\pm 1, \pm \frac{1}{2}, \pm 13, \pm \frac{13}{2}, \pm \frac{1}{13}, \pm \frac{1}{26}$

D)  $\pm 1, \pm \frac{1}{13}, \pm 2, \pm 13, \pm 26$

22) C

18

Given the polynomial function  $f(x)$ , find the rational zeros, then the other zeros (that is, solve the equation  $f(x) = 0$ ), and factor  $f(x)$  into linear factors.

23)  $f(x) = x^3 + 8x^2 - 2x - 16$

23) D

A)  $-8, -2, 2; f(x) = (x + 8)(x + 2)(x - 2)$

B)  $-\sqrt{8}$ , multiplicity 2;  $-\sqrt{2}$ , multiplicity 2;  $f(x) = (x + \sqrt{8})^2(x + \sqrt{2})^2$

C)  $-\sqrt{8}$ , multiplicity 2;  $-2; f(x) = (x + \sqrt{8})^2(x + 2)$

D)  $-8, -\sqrt{2}, \sqrt{2}; f(x) = (x + 8)(x + \sqrt{2})(x - \sqrt{2})$

Find only the rational zeros.

24)  $f(x) = 3x^3 + 7x^2 - 22x - 8$

24) A

A)  $-4, 2, -\frac{1}{3}$

B)  $4, -2, \frac{1}{3}$

C)  $-4, 2, -1$

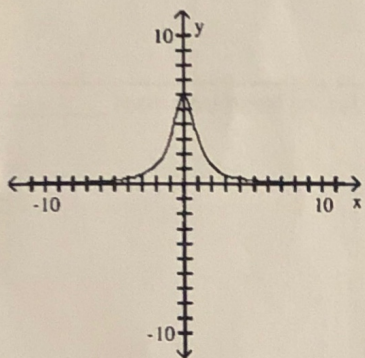
D)  $4, -2, 1$

Match the equation with the appropriate graph.

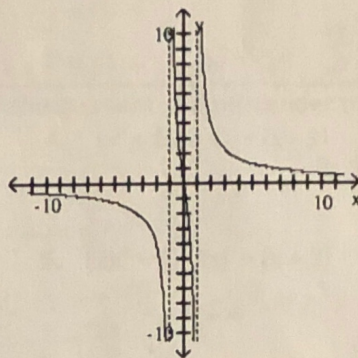
25)  $f(x) = \frac{6x}{x^2 - 1}$

25) B

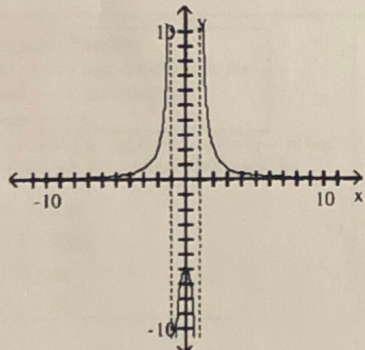
A)



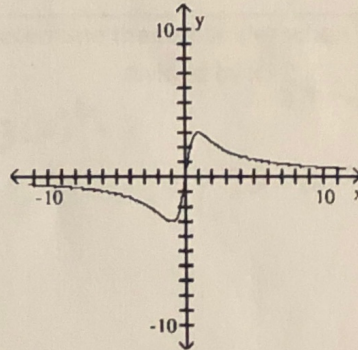
B)



C)



D)



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