Name: _____

Review EOC #3

1) What is the complex conjugate of $7 + \sqrt{-8}$?

A. $7 + 4i\sqrt{2}$
B. $7 - 4i\sqrt{2}$
C. $7 + 2i\sqrt{2}$
D. $7 - 2i\sqrt{2}$

simplify radical

$\sqrt{-8}$ → $4 \cdot 2$ → $2i\sqrt{2}$

* only middle sign changes!

2) Simplify $(2\sqrt{5})^2 - (3 - \sqrt{-6})(3 + \sqrt{-6})$.

A. 1
B. 5
C. 11
D. 17

$20 - 9 + 3\sqrt{6} - 3\sqrt{6} - 6i^2$

$9 + 6 = 15$

$20 - 15 = 5$

3) Rationalize $\frac{1+i}{1-i}$.

$\frac{1+i}{1+i} = \frac{1+i+i+i^2}{1+i-i-i^2} = \frac{2i}{2} = i$

A. -1
B. 1
C. $-i$
D. i

5) What is the complex conjugate of $\frac{1}{2} - 2i$?

A. $2 - 2i$
B. $2 - \frac{1}{2}i$
C. $\frac{1}{2}i - 2$
D. $\frac{1}{2} + 2i$

change middle sign

8) What is the product of $(4 - 3i)$ and $(-7 - 2i)$?

FOIL

$(4-3i)(-7-2i)$

$-28 - 8i + 21i + 6i^2$

$-28 + 13i - 6$

$-34 + 13i$

A. $-23 + 13i$
B. $-23 - 29i$
C. $-34 + 13i$
D. $-34 - 29i$

9) If $c - d = 7$ and $c = 3 - 4i$, what is d ?

$3 - 4i - d = 7$

$-4i - d = 4$

$-d = 4 + 4i$

$d = -4 - 4i$

A. $-4 - 4i$
B. $-4 + 4i$
C. $4 - 4i$
D. $4 + 4i$

10) What is the sum of $2i$, $-5 - 6i$, and 7 ?

$2i - 5 - 6i + 7$

$2 - 4i$

A. $7 - 9i$
B. $2 - 4i$
C. $2 + 8i$
D. $7 + i$

11) Write $\frac{9 - i^2}{3 - i}$ in standard form.

$\frac{9-i^2}{3-i} \cdot \frac{3+i}{3+i} = \frac{10}{3-i}\frac{3+i}{3+i}$

$\frac{10(3+i)}{9+1} = \frac{10(3+i)}{10} = 3+i$

A. $3 - i$
B. $3 + i$
C. $\frac{10}{3}$
D. $\frac{8}{3}$

12) What is the first step in simplifying $\frac{6-4i}{-5+3i}$?

$-5 - 3i$ is the complex conjugate

A. Multiply the fraction by $\frac{6+4i}{6+4i}$.
B. Multiply the fraction by $\frac{-5-3i}{-5-3i}$.
C. Multiply the fraction by $6 + 4i$.
D. Multiply the fraction by $-5 - 3i$.

14) Let m and n be real numbers. Find the real and imaginary parts of $(3 + mi)(n - 2i)$.

A. Real: $(3n - 2m)$; Imaginary: $(6 - mn)i$
B. Real: $(3n - 2m)$; Imaginary: $(mn - 6)i$
C. Real: $(3n + 2m)$; Imaginary: $(mn - 6)i$
D. Real: $3n$; Imaginary: $2mi$

FOIL
$3n - 6i + mni - 2mi^2$
real: $(3n + 2m)$ imag: $(mn - 6)i$

25) Sally observes that the data derived from an experiment seems to be parabolic when plotted on ordinary graph paper. Three of the observed points are (1,20), (2,21), and (3,18). Use the equation of the parabola that contains these 3 points to determine the y-value at $x = 4$.

A. $y = -8$
B. $y = 11$
C. $y = 17$
D. $y = 27$

56) What are the zeros of the quadratic function $f(x) = x^2 + 3x + 1$?

A. $\frac{-3 \pm \sqrt{5}}{2}$
B. $\frac{-3 \pm \sqrt{13}}{2}$
C. $\frac{3 \pm \sqrt{5}}{2}$
D. $\frac{3 \pm \sqrt{13}}{2}$

$\frac{-3 \pm \sqrt{3^2 - 4(1)(1)}}{2(1)}$
$\frac{-3 \pm \sqrt{9-4}}{2} = \frac{-3 \pm \sqrt{5}}{2}$

57) The height above ground of an object thrown upward from an initial height of s ft with an initial velocity of v ft/sec is modeled by $h(t) = -16t^2 + vt + s$. Javier throws a baseball upward at 80 ft/sec from a platform 64 ft above the ground. To the nearest tenth of a second, when will the baseball hit the ground?

A. 0.7
B. 2.5
C. 5.0
D. 5.7

$h(t) = -16t^2 + 80t + 64$
plug into calculator
ground = x-axis
so find the zero

58) For what values of c will $x^2 + 4x + c = 0$ have 2 complex conjugate roots?

A. $c < 2$
B. $c > 2$
C. $c < 4$
D. $c > 4$

ex. $x^2 + 4x + 1$ $x^2 + 4x + 3$ $x^2 + 4x + 5$
graph for each situation
does not cross x-axis

60) What is the solution set for $5t^2 + 6 = 8t$?

A. $\{-\frac{3}{5} \pm \frac{i}{5}\sqrt{31}\}$
B. $\{\frac{4}{5} \pm \frac{2}{5}i\sqrt{14}\}$
C. $\{-\frac{4}{5} \pm \frac{i}{5}\sqrt{14}\}$
D. $\{\frac{4}{5} \pm \frac{i}{5}\sqrt{14}\}$

$5t^2 - 8t + 6 = 0$
$\frac{8 \pm \sqrt{-8^2 - 4(5)(6)}}{2(5)}$
$\frac{8 \pm 2i\sqrt{14}}{10}$ simplify.

63) What are the roots of this equation?

$x^2 + 2x + 12 = 0$

A. $-1 \pm i\sqrt{11}$
B. $-2 \pm i\sqrt{11}$
C. $-2 \pm 2i\sqrt{11}$
D. $-1 \pm 2i\sqrt{11}$

$\frac{-2 \pm \sqrt{2^2 - 4(1)(12)}}{2(1)}$
$\frac{-2 \pm \sqrt{4-48}}{2} = \frac{-2 \pm \sqrt{-44}}{2} =$
$\frac{-2 \pm 2i\sqrt{11}}{2}$ simplify.

64) Given $x > 0$, at which value of x will $y_2 - y_1 = 2$?

$y_1 = 2x^2 - 2x + 5$
$y_2 = 3x^2 - 5x + 7$

A. 2
B. 3
C. 4
D. 5

easiest just to plug in choices
$2(2^2) - 2(2) + 5 \quad -3(2^2) - 5(2) + 7$
$2(3^2) - 2(3) + 5 \quad 3(3^2) - 5(3) + 7$

65) What is the solution set to this inequality?

$x^2 - 6x + 7 \leq 2x - 5$

A. $\{x \mid x \leq 2 \text{ or } x \geq 6\}$
B. $\{x \mid x < 2 \text{ or } x > 6\}$
C. $\{x \mid 2 \leq x \leq 6\}$
D. $\{x \mid 2 < x < 6\}$

$x^2 - 8x + 12 \leq 0$
$(x-6)(x-2)$ less than and.
$x \leq 6 \quad x \geq 2$

66) For the equation $x^2 - 4x + 4 = 9$, determine the discriminant.

A. −36
B. 0
C. 6
D. 36

$\sqrt{b^2-4ac}$
$-4^2-4(1)(-5)$
$16 + 20 = 36$

70) The formula $L = 0.1s^2 - 3s + 22$ gives the approximate runway length required to land a small plane. L is the length of the runway, in feet, and s is the landing speed of the airplane, in feet per second. The pilot knows that the runway is 2,400 ft long. To the nearest foot per second, what is the maximum safe landing speed?

A. 50
B. 90
C. 140
D. 170

$2400 = 0.1s^2 - 3s + 22$
$0.1s^2 - 3s - 2378$
$\frac{3 \pm \sqrt{-3^2-4(.1)(-2378)}}{2(.1)}$

75) Which transformations can be performed on the graph of $f(x) = x^2$ that result in the graph of $f'(x) = -2x^2 - 12x - 13$?

A. Shift left 3 units, stretch horizontally by a factor of 2, reflect through the y-axis, and shift down 5 units
B. Shift right 3 units, stretch horizontally by a factor of 2, reflect through the y-axis, and shift down 5 units
C. Shift left 3 units, stretch vertically by a factor of 2, reflect through the x-axis, and shift up 5 units
D. Shift right 3 units, stretch vertically by a factor of 2, reflect through the x-axis, and shift down 5 units

x^2: + → − = reflect over x
x^2 mult. by 2 = vertical stretch
compare vertex of each graph to show transformation
L→R and ⇑⇓

76) The function $y = (x + 2)^2 + 3$ is reflected across the y-axis. What are the coordinates of the vertex after this reflection?

A. (−2,−3)
B. (−2,3)
C. (2,−3)
D. (2,3)

vertex = (−2,3)
reflect across y changes x value only

80) Which equation is the reflection of $y = x^2 - 4x + 3$ across the x-axis?

A. $y = x^2 - 4x + 3$
B. $y = x^2 - 4x - 3$
C. $y = -x^2 + 4x - 3$
D. $y = -x^2 + 4x + 3$

flips graph so flip signs

112) Julio throws an inflated ball up in the air. The function $h(t) = -\frac{1}{20}t^2 + \frac{1}{10}t + 4$ models the ball's height in terms of time t, in seconds. After how many seconds will the ball hit the ground?

A. 0
B. 4
C. 8
D. 10

graph - find zero.

114) For what values of x does the graph of $f(x) = 3x^2 - 5\frac{1}{2}x - 5$ intersect the x-axis?

A. −11 and 5
B. 11 and −5
C. $-2\frac{1}{2}$ and $\frac{2}{3}$
D. $2\frac{1}{2}$ and $-\frac{2}{3}$

graph - find zeros

119) Maury is standing on top of a building. He throws a ball up from the top of the building. The height of the ball is modeled by $h(x) = -16t^2 + 12t + 40$. How many seconds after release will the ball hit the ground?

A. −2
B. $-\frac{5}{4}$
C. $\frac{5}{4}$
D. 2

graph - find zero

Name _____

EOC Review #4

59) One zero of $f(x) = x^4 + x^3 - 2x^2 + 4x - 24$ is $2i$. What are the other zeros of this function?

A. $-2i, -3, 2$
B. $-2i, 3, -2$
C. $-4i, -3, 2$
D. $-4i, 3, -2$

-2i because conjugate also must be zero graph to find 2 real zeros

74) Find all solutions to the equation $-2x^3 - 3x^2 + 5x + 6 = 0$, rounding decimals to the nearest 0.1.

A. $-3.0, 2.0$
B. $-2.0, -1.0, 1.5$
C. $-2.0, 3.0$
D. $(-0.5 + 2.1i), (-0.5 - 2.1i), 2.8$

97) The area of a right triangle is $\frac{1}{2}x^2 - 5x + 12$. If one leg is $x - 4$, what is the other leg?

A. $x - 3$
B. $x - 6$
C. $\frac{1}{2}x - 3$
D. $\frac{1}{2}x - 4 + \frac{4}{x-2}$

4 | 1/2 -5 12
↓ 2 -12
1/2 -3 LO
1/2x - 3 = 0
1/2x = 3
x = 6
(x-6) factor

98) Evaluate this function for $x = -3$.

$$f(x) = 4x^3 - 5x^2 + 2x - 4$$

A. -163
B. -151
C. -73
D. 53

$4(-3)^3 - 5(-3)^2 + 2(-3) - 4$

99) Given that $f(-3) = 0$, $f(-1) = 0$, completely factor $f(x) = x^4 + 5x^3 + 3x^2 - 13x - 12$ over the integers.

A. $(x - 3)(x - 1)(x + 2)(x - 2)$
B. $(x + 3)(x + 1)(x + 2)(x - 2)$
C. $(x - 3)(x - 1)(x^2 + x - 4)$
D. $(x + 3)(x + 1)(x^2 + x - 4)$

-3 | 1 5 3 -13 -12
↓ -3 -6 9 12
-1 | 1 2 -3 -4 LO
↓ -1 -1 4
1 1 -4 LO

100) What is the completely factored form of this expression?

$$2x^3 - 9x^2 + 7x + 6$$

A. $(x + 2)(2x + 1)(x - 3)$
B. $(x + 2)(2x - 1)(x - 3)$
C. $(x - 2)(2x + 1)(x - 3)$
D. $(x - 2)(2x - 1)(x + 3)$

2, 3
(x-2)(x-3)
$2x^3 - 9x^2 + 7x + 6$
2 | 2 -9 7 6
↓ 4 -10 -6
2 -5 -3 LO

101) Simplify this expression:

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

A. $-5x^2 - 15x + 18$
B. $-5x^2 + 15x - 22$
C. $-9x^2 - 15x + 18$
D. $-9x^2 + 15x - 22$

$3x^2 + 6 - 10x^2 - 15x + 20$
$-2x^2 - 8$
$-9x^2 - 15x + 18$

$2x^2 - 5x - 3 = 0$
$x^2 - 5x - 6 = 0$
$(x-6)(x+1)$
$(x-3)(2x+1)$

103) Which is an equivalent form of this expression?

$$(3x + 2)(x - 5) - 6(x - 1)$$

A. $3x^2 - 6x - 9$
B. $3x^2 - 7x - 11$
C. $3x^2 - 9x - 16$
D. $3x^2 - 19x - 4$

$3x^2 - 15x + 2x - 10$
$3x^2 - 13x - 10 - (6x - 6)$
$3x^2 - 19x - 4$

105) If $f(x) = -9x^3 + x^2 + 3x$, find $f(-\frac{2}{3})$.

A. $-\frac{2}{3}$
B. $-\frac{1}{4}$
C. $-\frac{2}{9}$
D. $\frac{10}{9}$

$-9(-2/3)^3 + (-2/3)^2 + 3(-2/3)$

107) What is the nature of the zeros of the polynomial $f(x) = 2x^3 - x^2 - 18x + 9$?

A. 3 real rational
B. 3 real; 1 rational and 2 irrational
C. 1 real rational, 2 nonreal complex
D. 1 real irrational, 2 nonreal complex

108) Which cubic polynomial has 3 and $3 - i$ as zeros?

A. $x^3 - 3x^2 - 9x + 27$
B. $x^3 + 3x^2 - 10x - 30$
C. $x^3 - 9x^2 + 28x - 30$
D. $x^3 + 9x^2 + 28x + 30$

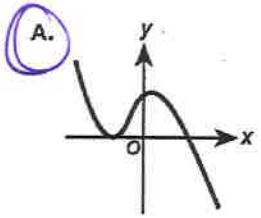
$(x-3)(x-3-i)(x-3+i)$ FOIL then multiply

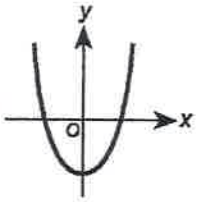
109) A fourth degree polynomial, $P(x)$, with real coefficients has 4 distinct zeros. Two of them are -5 and i. What can be concluded about the other zeros?

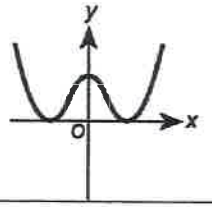
A. The other zeros must be 5 and $-i$.
B. One of the other zeros must be $-5 \pm i$.
C. One of the other zeros must be $5 \pm i$.
D. The other zeros must be $-i$ and a real number.

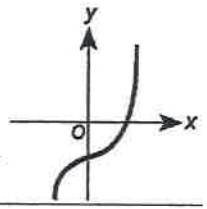
$-i$ has to be a zero, the other must be real

110) Which graph could represent a cubic function with 2 distinct real zeros?

A. 

C. 

B. 

D. 

111) How many real zeros does $h(t)$ have?

$$h(t) = 4t^3 - 2t^2 + t - 10$$

A. 3
B. 2
C. 1
D. 0

graph - where does it cross?

115) What are the rational zeros for $x^3 - 3x^2 - 4x + 12$?

A. $-2, 2, 3$
B. $-2, 2, -3$
C. $1, 2, 3, 4, 6, 12$
D. $\pm1, \pm2, \pm3, \pm4, \pm6, \pm12$

$-2, 2, 3$
graph - find x-int. $y=0$

117) How many real roots does $f(x) = x^3 + 2x^2 + x$ have?

A. 0
B. 1
C. 2
D. 3

graph!

118) Find all zeros of $f(x) = x^4 - 1$.

A. $x = -1, 1$
B. $x = 1, i$
C. $x = 1, i, -i$
D. $x = 1, -1, i, -i$

$(x^2+1)(x^2-1)$
$x^2 = -1$ $(x+1)(x-1)$
$x = \pm\sqrt{-1}$ $x=-1$ $x=1$
$x = \pm i$

121) The zeros of the polynomial function $f(x) = x^3 + bx^2 + cx + d$ are 2, 1, and -1. Which equation could be used to represent $f(x)$?

A. $f(x) = x^3 + 2x^2 + x - 2$
B. $f(x) = x^3 - 2x^2 - x + 2$
C. $f(x) = x^3 + 2x^2 - x - 2$
D. $f(x) = x^3 - 2x^2 + x + 2$

$(x-2)(x-1)(x+1)$
$x^2 - x - 2x + 2$
$(x^2 - 3x + 2)(x+1)$
$x^3 + x^2 - 3x^2 - 3x + 2x + 2$
$x^3 - 2x^2 - x + 2$

125) A certain polynomial has these factors and no others: $(3x - 2)$, $(x^2 - 1)$, and $(x + 4)$. What are the zeros of this polynomial?

A. $4, -2, -1$
B. $4, 1, 2$
C. $-4, \frac{2}{3}, 1$
D. $-4, -1, \frac{2}{3}, 1$

$3x-2=0$ x^2-1 $x+4$
$3x=2$ $(x+1)(x-1)$ $x=-4$
$x=2/3$ $x=-1$ $x=1$