Midterm Review

Multiple Choice

Identify the choice that best completes the statement or answers the question.

D 1. Rewrite in standard form and then classify by $-3x^5 + 4x^3 + x^2 - x^3 + 3x^5$ by degree and by number of terms

a. quadratic trinomial
b. cubic trinomial
c. quintic polynomial
d. cubic binomial

$3x^3 + x^2$

A (or D) 2. Write $2x^3 + 14x^2 + 20x$ in factored form.

a. $2x(x + 5)(x + 2)$
b. $2x(x + 5)(x - 2)$
c. $5x(x + 2)(x + 2)$
d. $2x(x + 2)(x + 5)$

$2x(x^2 + 7x + 10)$
$2x(x+5)(x+2)$

D 4. Write a polynomial function in standard form with zeros at 5, –4, and –3.

a. $f(x) = x^3 - 60x^2 + 2x - 23$
b. $f(x) = x^3 + 2x^2 - 23x + 7$
c. $f(x) = x^3 - 17x^2 - 420x + 7$
d. $f(x) = x^3 + 2x^2 - 23x - 60$

$(x-5)(x+4)(x+3)$
$x^2 + 4x - 5x - 20$
$(x^2 - x - 20)(x+3)$
$x^3 + 3x^2 - x^2 - 3x - 20x - 60$
$x^3 + 2x^2 - 23x - 60$

B 5. Find the zeros of $f(x) = (x + 2)^6(x + 3)^4$ and state the multiplicity.

a. –2, multiplicity 6; 4, multiplicity –3
b. –2, multiplicity 6; –3, multiplicity 4
c. 6, multiplicity –2; –3, multiplicity 4
d. 6, multiplicity –2; 4, multiplicity –3

$x = -2$ w mult 6
and
$x = -3$ w mult 4

D 6. Divide $-x^3 + 4x^2 - x - 3$ by $x + 2$.

a. $-x^2 + 6x - 13$
b. $-x^2 + 2x + 11$, R –29
c. $-x^2 + 2x + 11$
d. $-x^2 + 6x - 13$, R 23

$$\begin{array}{r|rrrr} & -1 & 4 & -1 & -3 \\ -2 & & 2 & -12 & 26 \\ \hline & -1 & 6 & -13 & \boxed{23} \end{array}$$

$-x^2 + 6x - 13 \quad \frac{23}{x+2}$

Divide using synthetic division.

A 7. $(x^4 + 12x^3 - 91x^2 + 26x + 20) \div (x - 5)$

a. $x^3 + 17x^2 - 6x - 4$
b. $x^3 - 22x^2 - 79x + 34$
c. $x^3 + 12x^2 - 22x + 34$
d. $x^3 - 6x^2 - 4x + 17$

$$\begin{array}{r|rrrrr} & 1 & 12 & -91 & 26 & 20 \\ 5 & & 5 & 85 & -30 & -20 \\ \hline & 1 & 17 & -6 & -4 & \boxed{0} \end{array}$$

$x^3 + 17x^2 - 6x - 4$

Factor the expression. Use SOAP!

B 8. $x^3 - 125$

~~a.~~ $(x + 5)(x^2 + 5x + 25)$
b. $(x - 5)(x^2 + 5x + 25)$
~~c.~~ $(x + 5)(x^2 - 5x + 25)$
d. $(x - 5)(x^2 - 5x + 50)$

D 9. Use the Binomial Theorem to expand $(d - 5)^6$

~~a.~~ $d^6 + 6d^5 + 15d^4 + 20d^3 + 15d^2 + 6d + 1$
b. $d^6 - 6d^5 + 15d^4 - 20d^3 + 15d^2 - 6d + 1$
~~c.~~ $d^6 + 30d^5 + 375d^4 + 2500d^3 + 9375d^2 + 18750d + + 15625$
d. $d^6 - 30d^5 + 375d^4 - 2500d^3 + 9375d^2 - 18750d + 15625$

Signs must alternate +, –, +, –

Compare 2nd terms:
$6(d^5)(-5)^1$
$-30d^5$

11. $10(s)^3(-5v)^2$

$10 \cdot s^3 \cdot 25v^2$ OR $250s^3v^2$

C 10. The completely factored form of $2d^4 + 6d^3 - 18d^2 - 54d$ is

a. $2d(d^2 - 9)(d + 3)$

b. $2d(d^2 + 9)(d + 3)$

c. $2d(d + 3)^2(d - 3)$

d. $2d(d - 3)^2(d + 3)$

GCF : $2d\,(d^3 + 3d^2 - 9d - 27)$

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

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

$2d\,(d+3)(d-3)(d+3)$

OR $2d(d+3)^2(d-3)$

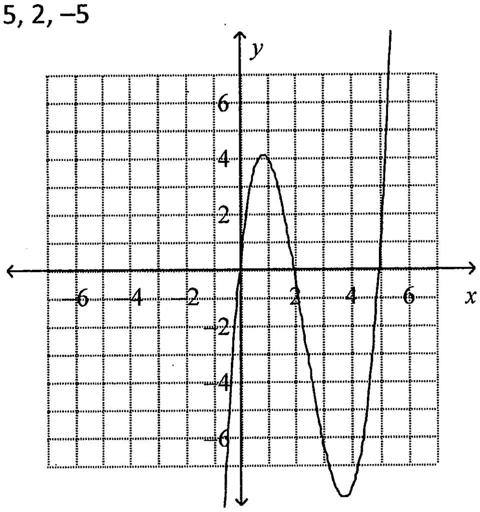
C 11. Find the 3rd term of the expansion of $(s - 5v)^5$

a. $10s^3v^2$ b. $-1250s^3v^2$ c. $250s^3v^2$ d. $250s^3$

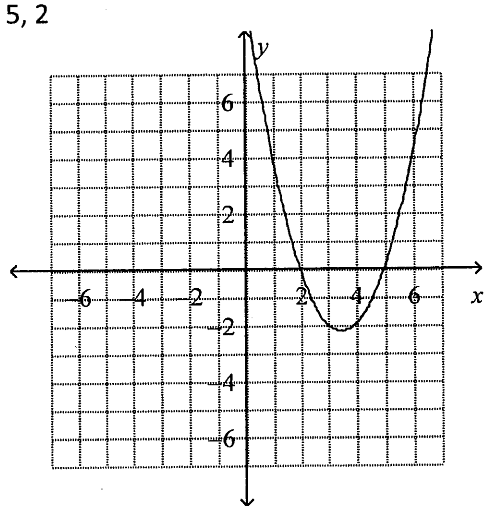
B 12. Find the zeros of $y = x(x - 5)(x - 2)$. Then graph the equation.

$x = 0,\ x = 5,\ x = 2$

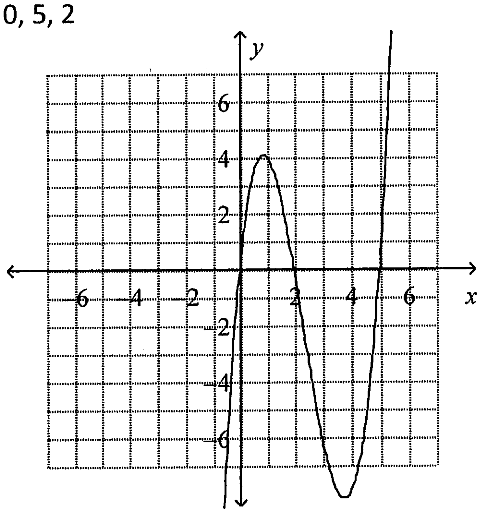
a. 5, 2, –5



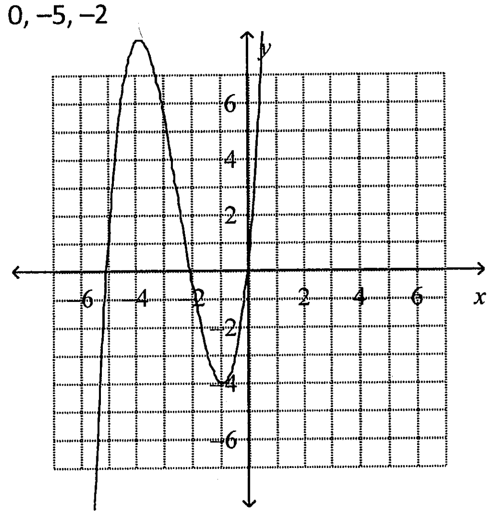
c. 5, 2



b. 0, 5, 2



d. 0, –5, –2



	1	-2	10	136
		-4	24	-136
-4	1	-6	34	0

Find the roots of the polynomial equation.

B 13. $x^3 - 2x^2 + 10x + 136 = 0$ — use tables

a. $-3 \pm 5i, -4$
b. $3 \pm 5i, -4$
c. $-3 \pm i, 4$
d. $3 \pm i, 4$

$x^2 - 6x + 34 = 0$
$x^2 - 6x = -34$
$x^2 - 6x + 9 = -34 + 9$
$(x-3)^2 = -25$
$x - 3 = \pm\sqrt{-25}$
$x = 3 \pm 5i$

D 14. $x^4 - 5x^3 + 11x^2 - 25x + 30 = 0$ — use tables

a. $-2, -3, \pm i\sqrt{5}$
b. $2, -3, \pm \sqrt{5}$
c. $-2, 3, \pm\sqrt{5}$
d. $2, 3, \pm i\sqrt{5}$

	1	-5	11	-25	30
		2	-6	10	-30
2	1	-3	5	-15	0

	1	-3	5	-15
		3	0	15
3	1	0	5	0

$x^2 + 5 = 0$
$x^2 = -5$
$x = \pm\sqrt{-5}$
$x = \pm i\sqrt{5}$

B 15.

Using the polynomial, $f(x) = -2x^3 + 4x - 8$, explain how the degree and leading coefficient will effect the end behavior.

A. Because the degree is odd, the ends will point in opposite directions, and because the leading coefficient is negative the graph will increase from right to left.

B. Because the degree is odd, the ends will point in opposite directions, and because the leading coefficient is negative the graph will decrease from right to left.

C. Because the degree is odd, the ends will point in the same direction, and because the leading coefficient is negative the graph will increase from right to left.

D. Because the degree is odd, the ends will point in the same direction, and because the leading coefficient is negative the graph will decrease from right to left.

A 16. Simplify completely

$9i(9 - 8i)$

$81i - 72i^2$
$81i - 72(-1)$
$81i + 72$
$72 + 81i$

A) $72 + 81i$ B) $81i - 72i^2$ C) $81i + 72i^2$ D) $81i - 72$

D 17. Simplify completely

$(8 - 3i)(3 + 2i)$

$24 + 16i - 9i - 6i^2$
$24 + 7i - 6(-1)$
$24 + 7i + 6$
$30 + 7i$

A) $30 - 7i$ B) $18 - 25i$ C) $-6i^2 + 7i + 24$ D) $30 + 7i$

B 18.

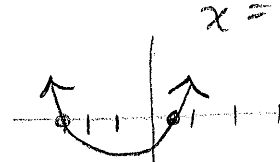
$2x^2 + 5x - 3 \le 0$

$\frac{6}{2}$ -6 5 $\frac{-1}{2}$

$(x+3)(2x-1) \le 0$
$x + 3 = 0$ $2x - 1 = 0$
$x = -3$ $2x = 1$
$x = \frac{1}{2}$

A) $(-\infty, -3] \cup \left[\frac{1}{2}, \infty\right]$ B) $\left[-3, \frac{1}{2}\right]$

C) $[-3, \infty)$ D) $\left[-\infty, \frac{1}{2}\right]$



$\left[-3, -\frac{1}{2}\right]$

1

1 1

1 2 1

1 3 3 1

1 4 6 4 1

1 5 10 10 5 1