Mathematics 3200

Unit: Polynomial Functions

Section 3.1-3.4

1. What is the end behavior of the polynomial function $y = -5x^3 + 2x^2 - x + 3$?

A) extends from Quadrant I to Quadrant II
B) extends from Quadrant II to Quadrant IV
C) extends from Quadrant I to Quadrant III
D) extends from Quadrant III to Quadrant IV

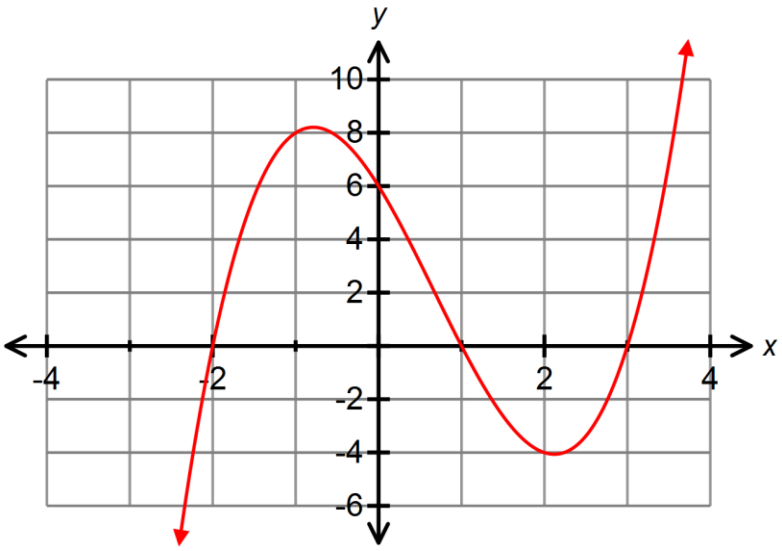
2. The graph of a third degree polynomial function of the form $P(x) = ax^3 + bx^2 + cx + d$ is shown. Which statement about the values of a and d is correct?

(A) $a > 0$ and $d > 0$

(B) $a > 0$ and $d < 0$

(C) $a < 0$ and $d > 0$

(D) $a < 0$ and $d < 0$



3. What is the y-intercept of the polynomial function $P(x) = -\frac{1}{2}(x-3)(x+2)^2$?

A) $(0,-6)$
B) $(0,-3)$
C) $(0,3)$
D) $(0,6)$

4. What are the zeros of the polynomial function $P(x) = x(4x-3)(3x+2)$?

A) $-2, 0, 3$

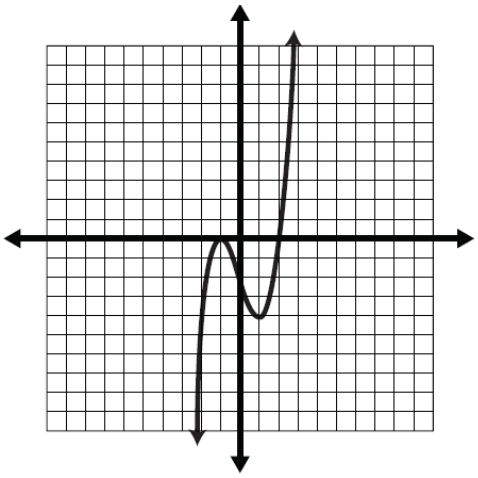
B) $-\frac{4}{3}, 0, \frac{3}{2}$

C) $-\frac{3}{4}, 0, \frac{2}{3}$

D) $-\frac{2}{3}, 0, \frac{3}{4}$

5. Which statement best describes the zeros of the following graph?

A) 1 (multiplicity 2); - 2 (multiplicity 1)
B) -1 (multiplicity 1); 2 (multiplicity 2)
C) -1 (multiplicity 2); 2 (multiplicity 1)
D) 1 (multiplicity 1); -2 (multiplicity 2)



6. Which polynomial function has zeros of -1, 3(multiplicity 2), 4 and y-intercept = -36?

(A) $y = (x-1)(x+3)(x+4)^2$

(B) $y = (x-1)(x+3)^2(x+4)$

(C) $y = (x+1)(x-3)(x-4)^2$

(D) $y = (x+1)(x-3)^2(x-4)$

7. Which polynomial function matches the given characteristics of $P(x)$?

A) $P(x) = \frac{1}{2}(x-1)^2(x+3)^2$

B) $P(x) = \frac{1}{2}(x+1)^2(x-3)^2$

C) $P(x) = 4(x-1)^2(x+3)^2$

D) $P(x) = 4(x+1)^2(x-3)^2$

Characteristics of P(x):

X-intercepts: (-1,0) and (3,0)
sign of leading coefficient: positive
polynomial degree : 4
relative maximum at (1,8)

8. What is the remainder when $2x^3 - x^2 - 3x - 2$ is divided by $x - 1$?

A) -4

B) -2

C) 0

D) 2

9. What is the factored form of $P(x) = x^3 + 3x^2 - x - 3$

A) $P(x) = (x+3)(x^2-1)$

B) $P(x) = (x+3)(x^2+1)$

C) $P(x) = (x-3)(x-1)^2$

D) $P(x) = (x-3)(x+1)^2$

10. What are the possible integral zeros of the polynomial $P(x) = x^3 + 6x^2 - 6x - 8$?

A) $\pm 1, \pm 8$

B) $\pm 1, \pm 2, \pm 4, \pm 8$

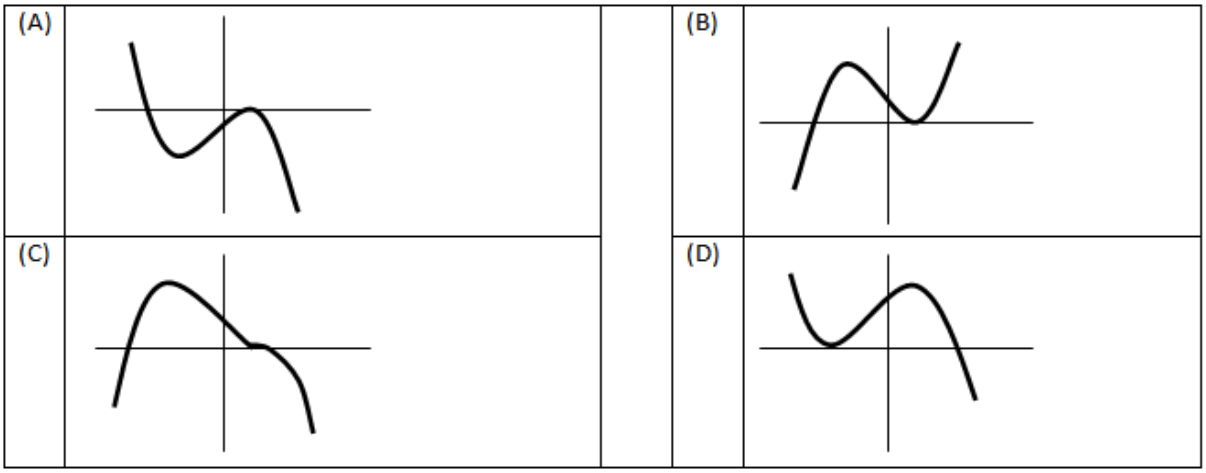
C) 1, 8

D) $\pm 2, \pm 4, \pm 8$

11. Determine the value of k so that $x+2$ is a factor of $x^3+10x^2+23x+k$

A) $k=-14$
B) $k=-1$
C) $k=1$
D) $k=14$

12. Which of the following graphs could be the graph of the polynomial function $P(x)=c(x+a)^2(x+b)$ if $a<0, b>0$ and $c<0$?



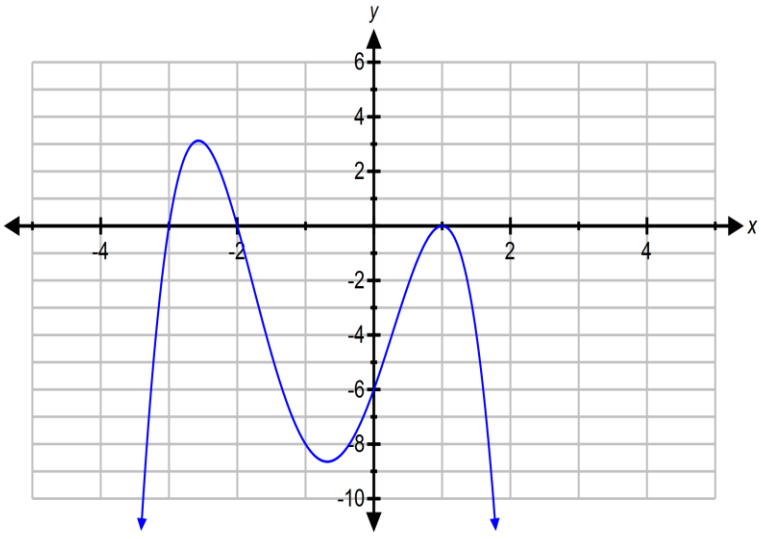
13. Given the following graph of a polynomial function, on which interval is $P(x)<0$?

A) $-3<x<-2$

B) $-2<x<1$

C) $x<-3$ or $x>-2$

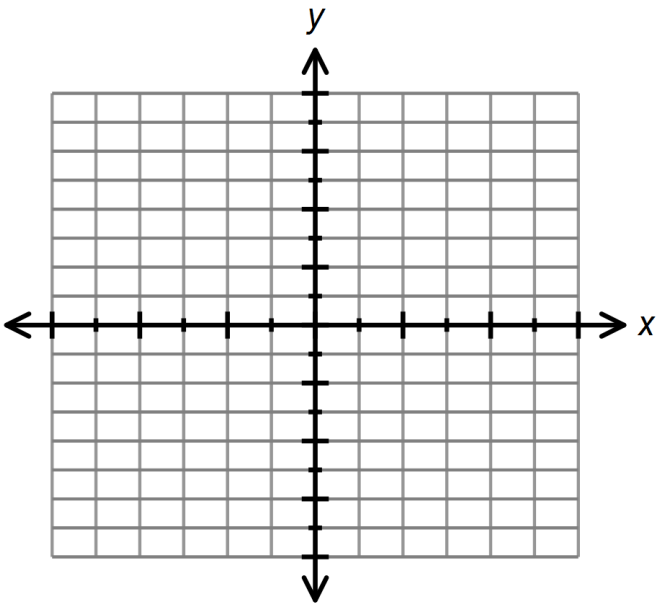
D) $x<-3$ or $x>-2, x\neq 1$



14. Mary claims that all graphs of polynomial functions of the form $y = ax^n + x + b$ where *a*, *n*, and *b* are odd integers, extend from Quadrant II to Quadrant IV. Do you agree? Use examples to explain your answer.

15. Determine the remainder if the polynomial $2x^3 - 5x + 3$ is divided by $2x + 3$.

16. Sketch a polynomial with degree 3, a positive leading coefficient and two *x*-intercepts.

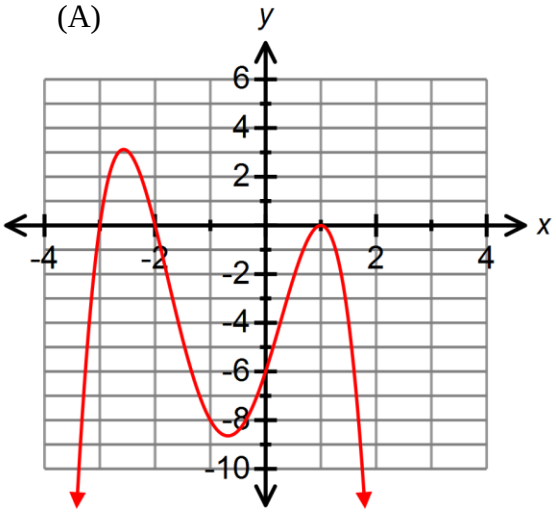


17. State the following for the graphs provided:

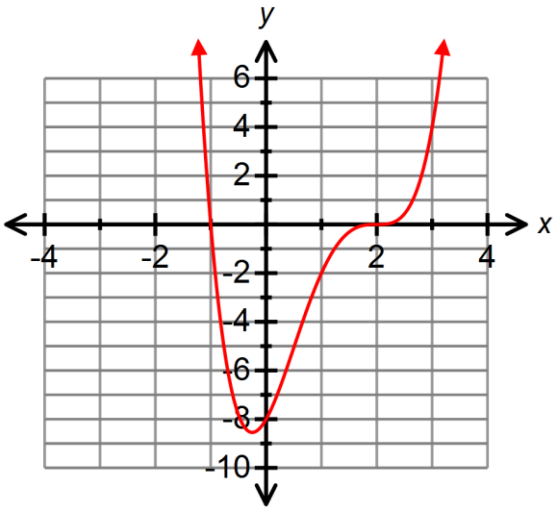
(i) the *x*-intercepts and explain whether the graph might represent a polynomial that has zeros of multiplicity 1, 2, or 3

(ii) determine the equation of the polynomial function.

(A)



(B)



18. For what value of *m* will the polynomial $P(x) = x^3 + 6x^2 + mx - 4$ have the same remainder when it is divided by *x* - 1 and *x* + 2?

19. If $P(x) = 2x^3 - x^2 - 13x - 6$ and P(3)=0, determine the other roots.

20. Factor the following:

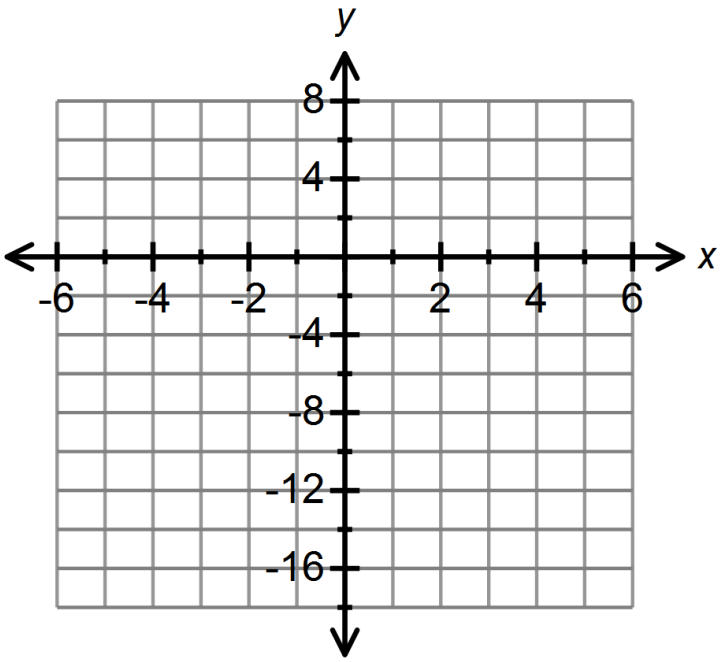
(i) $P(x) = 6x^3 + 10x^2 - 4x$

(ii) $P(x) = x^3 - x^2 - 4x + 4$

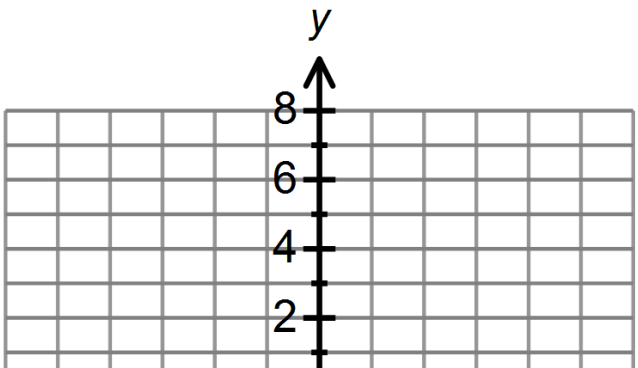
(iii) $P(x) = x^4 + x^3 - 13x^2 - 25x - 12$

21. Sketch the graph of each polynomial and label the intercepts.

(i) $P(x) = (x+2)(x-1)^2(x-3)$



(ii) $P(x) = x^3 - x^2 - 4x + 4$



22. A local gift shop is having boxes made for customer purchases. The length of the bottom of the box is 5 cm greater than twice the width. The height of the box is three times the width. Algebraically determine the dimensions of the box with a volume of 7500 cm^3?