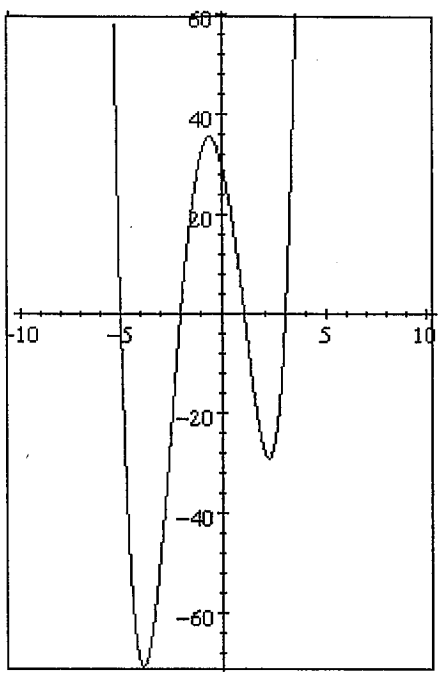
Multiple Choice **ZIPGRADE**

1. The degree of $f(x) = x^2 + x^3 + x^4$ is:
   a. 1
   b. 2
   c. 4
   d. 9



2. The graph of $f(x)$:
   a. Is odd degreed
   b. Is even degreed
   c. Is completely odd
   d. Is completely even

3. This quartic function:
   a. has three turning points and two points of inflection
   b. has three turning points and no points of inflection
   c. has two turning points and three points of inflection
   d. none of the above

4. The minimum information required to determine the equation of a cubic function is:
   a. all the zeros
   b. all the zeros and another point
   c. all the zeros, another point, and the sign of the lead coefficient
   d. all the zeros, another point, the sign of the lead coefficient, and the degree of the polynomial

5. In the equation $f(x) = k(x-s)(x-t)^2$, the value of k indicates:
   a. the direction of opening
   b. the existence of a local maximum
   c. the behaviour of the end points
   d. the number of turning points

6. The equation $f(x) = k(x-s)(x-t)^2$ represents a cubic function:
   a. with two zeros
   b. with three zeros
   c. with no turning point
   d. with three turning points

7. The equation of a cubic function with zeros at -2, 0, and 4 and end behaviour $f(x) \to \infty$ as $x \to \infty$ is:

a. $f(x) = x(x-2)(x+4)$

b. $f(x) = -x(x-2)(x+4)$

c. $f(x) = x(x+2)(x-4)$

d. $f(x) = -x(x+2)(x-4)$

8. Which of the following statements is (are) true for $f(x) = -2(x-1)(x-2)(x+3)$?

i) as $x \to \infty$, $f(x) \to -\infty$

ii) as $x \to \infty$, $f(x) \to \infty$

iii) as $x \to -\infty$, $f(x) \to -\infty$

iv) as $x \to -\infty$, $f(x) \to \infty$

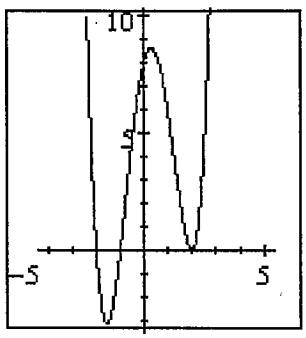
a. i)

b. i) and ii)

c. i) and iii)

d. i) and iv)

9. Refer to the graph. Which statement is false?



a. the degree equals the number of turning points

b. the lead coefficient is positive

c. the degree is even

d. it has a minimum value

10. Which of the following statement(s) is (are) true for $f(x) = -2(x-1)(x-2)(x+3)(x+4)$?

i) as $x \to \infty$, $f(x) \to -\infty$

ii) as $x \to \infty$, $f(x) \to \infty$

iii) as $x \to -\infty$, $f(x) \to \infty$

iv) as $x \to -\infty$, $f(x) \to -\infty$

a. i)

b. i) and ii)

c. i) and iii)

d. i) and iv)

11. The divisor is $x - 3$, the quotient is $x + 2$, and the remainder is 1. The dividend is:

a. $x^2 - 6$

b. $x^2 - x - 6$

c. $x^2 - x - 5$

d. $2x$

12. $x + 2$ is a factor of:

a. $x^2 + 4x + 4$

b. $x^2 - 4$

c. $x^3 + 2x^2 - x - 2$

d. all of the above

13. A factor of $x^4 - 5x^2 + 4$ is:

a. $x - 2$

b. $x - 1$

c. a and b

d. neither a nor b

14. $x - 2$ is not a factor of:

a. $x^3 - 5x^2 + 6x$

b. $x^3 - x^2 - 4x + 4$

c. $x^3 - 3x^2 - x + 3$

d. $x^4 - 2x^3 - x^2 + 2x$

15. When $x^3 - 3x^2 - 2x + 5$ is divided by $x - 2$, the remainder is:

a. 0

b. -1

c. 3

d. -3

16. Which is a true statement regarding the factor theorem?

a. $x - k$ is a factor of $f(x)$ if and only if $f(k) = 0$

b. if $x - b$ is a factor of $g(x)$, then $g(b) = 0$

c. if $h(c) = 0$, then $x - c$ is a factor of $h(x)$

d. all of the above

17. Which is a true statement regarding the remainder theorem?

a. when $f(x)$ is divided by $x - k$, then $f(k)$ = the remainder

b. when $g(x)$ is divided by $jx - k$, then $g(j/k)$ = the remainder

c. a and b

d. neither a nor b

18. If $f(k) \neq 0$, then:

a. $x - k$ is a factor of $f(x)$

b. $x + k$ is a factor of $f(x)$

c. $x - k$ is not a factor of $f(x)$

d. $x + k$ is not a factor of $f(x)$

19. $f\left(\frac{1}{2}\right) = 0$ and $f(-1) = 6$ indicates that:

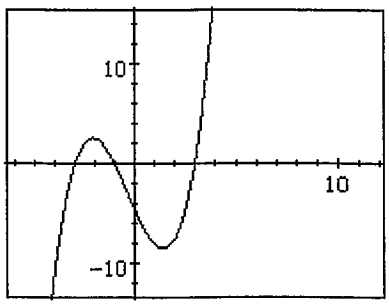
a. there is no remainder when $f(x)$ is divided by $2x - 1$

b. there is no remainder when $f(x)$ is divided by $x + 1$

c. $(2x - 1)$ and $(x + 1)$ are factors of $f(x)$

d. $f(x) = (2x - 1)(x + 1) + 6$

20. For $f(x) \geq 0$:



a. $x \in (-3,-1)$
$x \in [3,\infty)$

b. $x \in (-\infty,-3]$
$x \in [3,\infty)$

c. $x \in [-3,-1]$
$x \in [3,\infty)$

d. $x \in (-\infty,-3]$
$x \in [-3,-1]$