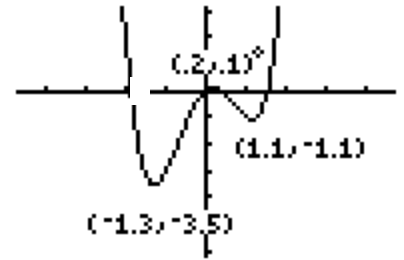**Use the graph at the right to answer questions #1 – 3:**

1. State where the absolute minimum value occurs for the function to the right.

2. On which interval(s) is the function to the right increasing?

3. State the local maximum value of the function to the right.

(.2,.1)

(1.1, -1.1)

(-1.3, -3.5)

4. State the correct interval notation for $-3 < x \le 5$.

5. Simplify: $\dfrac{\left(p^2 q^4\right)^{\frac{1}{2}}}{\left(27 p^6 q^3\right)^{\frac{1}{3}}}$

6. If f(-x) = -f(x), is the function even, odd, or neither?

7. Write an equation that can be obtained from transforming $y = x^2$ by a horizontal stretch of 4, a reflection over the y-axis, and a horizontal shift 5 units to the right?

8. The graph at right shows f(x) (the original graph in plain) and g(x), (the transformed graph in **bold**). Identify the equation that represents the transformation. (Multiple Choice)

   A. g(x) = f(x + 3) – 2   B. g(x) = f(x – 2) + 3

   C. g(x) = f(x + 2) + 3   D. g(x) = f(x + 2) – 3
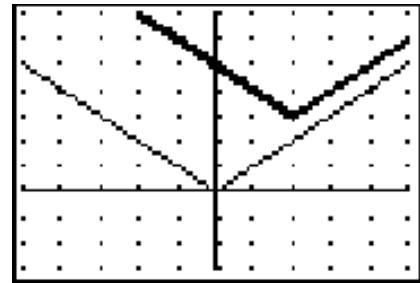
9. Let $f(x) = x^2 + 1$ and $g(x) = x^2 + 6x - 2$.
   a) Find $(g \, ^\circ f)(-2)$ b) Find $(g + f)(-3)$ c) Find $(gf)(4)$

10. If f(x) contains the point (-2, 6) and has an inverse function g(x), state a point that is possessed by the function g(x).

11. Without a calculator, factor the polynomial $x^3 - 3x^2 - 10x + 24$, given that 2 is a zero.

12. Without a calculator describe the end behavior of the following polynomials:
   a) f(x) = $-4x^5 + 3x - 1$ b) $g(x) = 3x^8 + 2$ c) $h(x) = 5x^7 + 4x + 1$

13. Find the remainder when $x^5 - 2x^4 + 3x^2 - 20x + 3$ is divided by $x + 3$.

14. Find the polynomial with real coefficients of least degree whose zeros are 2, and -i

15. Examine the graph and choose the BEST description. (Multiple Choice)

A. degree 3 with zeros at -2 (multiplicity 2) and at 3 (multiplicity 1)

B. degree 4 with zeros at -2 (multiplicity 2) and at 3 (multiplicity 2)

C. degree 3 with zeros at -2 and 3 with one imaginary zero

D. degree 5 with zeros at -2 (multiplicity 2) and at 3 (multiplicity 3)
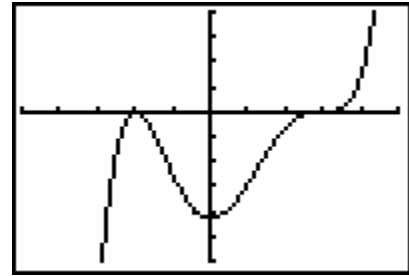
16. Which of the following graphs reflects behavior indicated by the statement $\lim_{x \to 3^-} = \infty$ (Multiple Choice)

A.

B.

C.

17. Given the polynomial $f(x) = \dfrac{6x^2+12x-18}{3x^2+30x+63}$ find all holes, asymptotes, and intercepts, then sketch the graph.

18. Create an equation that has a vertical asymptote x = 2, hole at (3, 8) and horizontal asymptote at y = 1.

Use the equation to answer questions #19 & 20. $f(x) = \dfrac{\sqrt{x+5}}{(2x-1)(x-1)}$

19. Where is f(x) = 0? In other words, where is the x-intercept?

20. Where is f(x) ≥ 0 ? Use interval notation. BE CAREFUL OF DOMAIN!

21. Solve. $1.85^x = 2$

22. In 2005, the population of Hartville was 23,000 and is increasing by 1.2% each year.
    a) Estimate the population of 2009.   b) Predict how long it will take for the population to reach 465,000

23. Find the inverse function of $y = \dfrac{5+x}{-2}$

24. Solve for x: $\dfrac{4x}{x+4} - \dfrac{3}{x-1} = \dfrac{-30}{2x^2+6x-8}$

25. Solve for x: $\log_6(x+1) - \log_6 x = \log_6 29$

26. State the value for x and y that would make the following statement true.
$-2(3x+2yi) + 8x + yi = (4+2i)(5-i)$