MAT 146

Prof. PORTER

TEST 1

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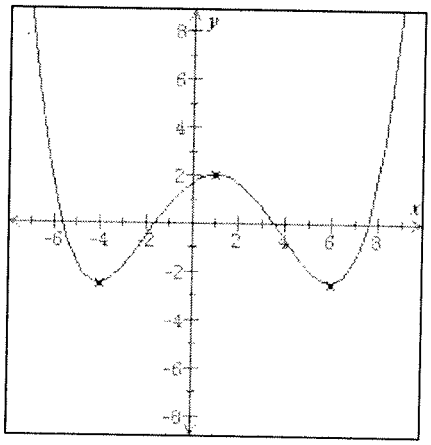
1. Choose the end behavior of the graph of each polynomial function.

(a) $f(x) = -4x^5 + 3x^4 - 9x^2 + x$ {(a) Rises, (b) Falls} to the left and {(a) rises, (b) falls} to the right.
(b) $f(x) = -2x^4 - 9x^2 + 3x + 5$ {(a) Rises, (b) Falls} to the left and {(a) rises, (b) falls} to the right.
(c) $f(x) = 3x(x+1)(x-4)^2$ {(a) Rises, (b) Falls} to the left and {(a) rises, (b) falls} to the right.

2. Find a polynomial $f(x)$ of degree 3 with real coefficients and the following zeros.

$-3\,,\ -1+i$

3. Below is the graph of a polynomial function f with real coefficients. Use the graph to answer the following questions about f. All local extrema of f are shown in the graph.



(a) The function f is increasing over which intervals? Choose all that apply.

$(-\infty,-4)$ $(-4,1)$ $(1,6)$ $(-4,6)$ $(6,\infty)$

(b) The function f has local minima at which x-values? If there is more than one value, separate them with commas.

(c) What is the sign of the leading coefficient of f?

Positive Negative Not enough information

(d) Which of the following is a possibility for the degree of f? Choose all that apply.

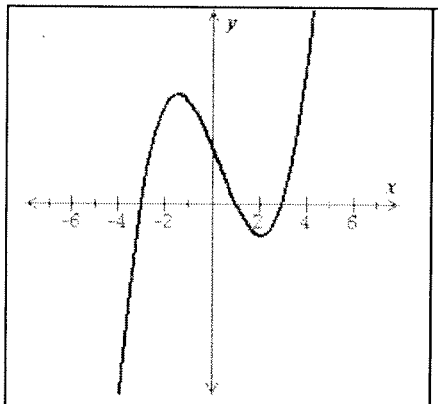
4 5 6 7 8 9

4. Consider the following polynomial functions.

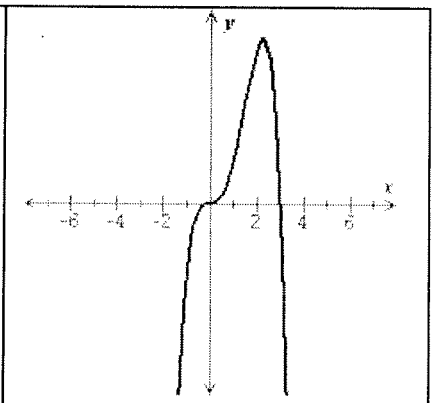
$$g(x) = -(x-1)\left(x^2-9\right)$$
$$h(x) = -3x^4+9x^3$$

Choose the graph of each function from the choices below.

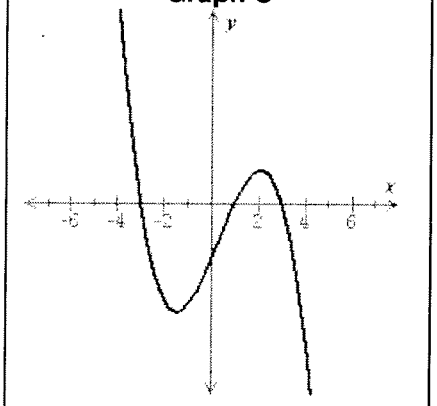
Graph A



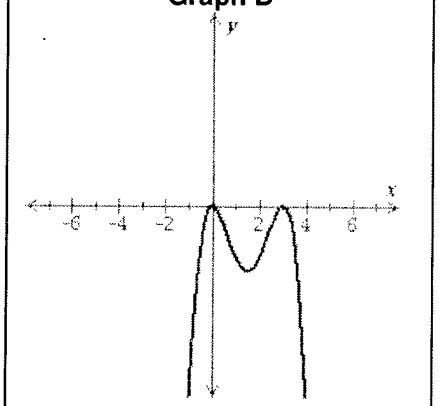
Graph B



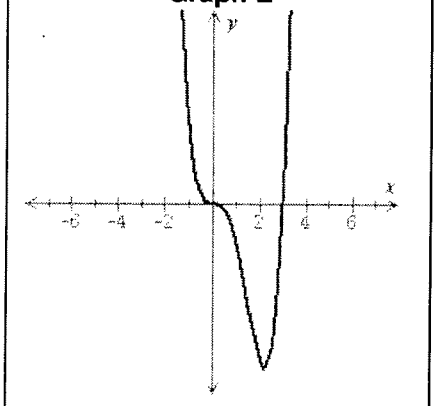
Graph C



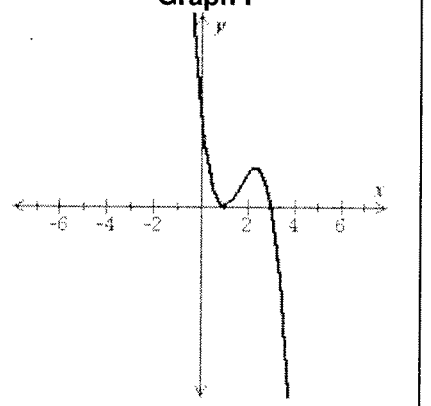
Graph D



Graph E



Graph F



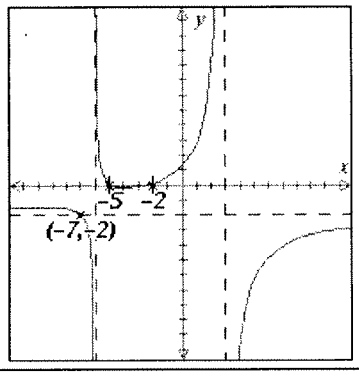
Which is the graph of $g(x) = -(x-1)\left(x^2-9\right)$?
Which is the graph of $h(x) = -3x^4+9x^3$?

5. Divide.

$$(2x^2+10x+9)\div(x+2)$$

6. The figure below shows the graph of a rational function f with vertical asymptotes $x=3$, $x=-6$, and horizontal asymptote $y=-2$. The graph also has x-intercepts of -2 and -5, and it passes through the point $(-7,-2)$.

The equation for $f(x)$ has one of the five forms shown below. Choose the appropriate form for $f(x)$, and then write the equation. You can assume that $f(x)$ is in simplest form.



- $f(x)=\dfrac{a}{x-b}$
- $f(x)=\dfrac{a(x-b)}{x-c}$
- $f(x)=\dfrac{a}{(x-b)(x-c)}$
- $f(x)=\dfrac{a(x-b)}{(x-c)(x-d)}$
- $f(x)=\dfrac{a(x-b)(x-$
  $(x-d)(x-e$

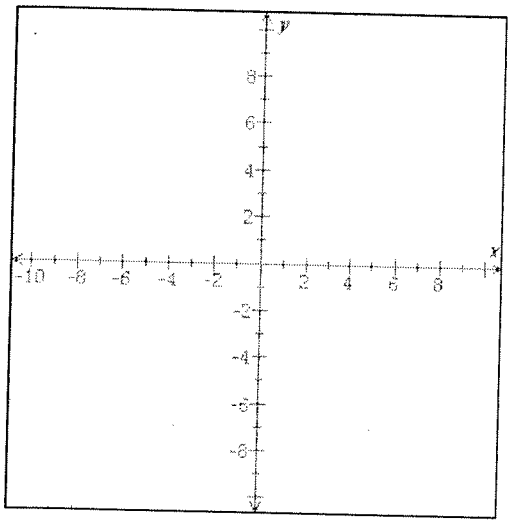
7. Solve the following inequality.

$$\frac{x-1}{x+5} \leq 0$$

Write your answer using interval notation.

8. Graph the following function.

$$g(x) = \frac{2}{3}e^{x-2} + 2$$



9. What is precalculus?

Give three small examples of the different ways that you can describe f(x)?

10. Suppose that an average 60" tall student weighs 100lbs, and an average 65" student weights 125lbs. Use a linear relationship to describe the average student's weight W as a function of the student's height H.

W(H)=_____

How much should a person weigh if they are 75" tall?

ANSWER:_____

How tall should a 200lb student be?

ANSWER:_____

11. Suppose you gather some more information and discover that not only can a 60" student weigh 100lbs, and a 65" student weigh 125lbs, but that a 63" student can weigh 140lbs and that a 70" student can weigh 200lbs. Find an Exponential and Cubic Regression to represent the weight W as a function of the Height H

Exponential:W(H)=_____

Cubic:W(H)=_____

Plot the data points and graph the regressions:

12. Find a zero for the cubic regression

Find the minimum for the quadratic regression

13. Describe the end behavior for the Linear, quadratic, and exponential regressions.

Linear: Left:_____ Right:_____

Quadratic: Left:_____ Right:_____

Exponential: Left:_____ Right:_____

14. Give a qualitative graph of the function:

$$k(x) = 3(x+.00002)^3(x-500)^4(x-.01)$$

When does the graph just touch the x-axis and not cross it?_____

15. Given the equation: $N = \dfrac{-3x^2+120,000}{x^2-.09} = \dfrac{-3(x-200)(x+200)}{(x-.3)(x+.3)}$

Find the x intercepts:_____

Find the y intercepts:_____

Give the vertical Asymptotes:_____

Give the Horizontal Asymptote:_____

16. Give a qualitative graph for the entire rational function above. Show the asymptotes and intercepts.