**Pre-Calculus 5th 6 Weeks Test Review** **DO ON OWN PAPER.**

## Non-Calculator Portion:

I. Quadratic Functions.

1. Sketch the graph of $f(x)=-x^2+6x+16$. Give the maximum and the zeros of the function.

2. Write the standard form of the equation of a parabola whose vertex is $(5,-2)$ and that passes through the point $(13,-1)$.

3. A stone falls from a cliff 512 meters above the ground. The height $s$ (in meters) of the stone above the ground $t$ seconds after it falls is given by the equation $s=-32t^2+512$. Find the height of the stone two seconds after it falls. Approximately how long will it take before the stone strikes the ground?

II. Sketch one possible graph given the following…

4. **Characteristics:**

A. $P(x)$ is a 4th degree polynomial with a negative leading coefficient.

B. $P(x)$ has two distinct negative real roots greater than –6 with a multiplicity of 1 each.

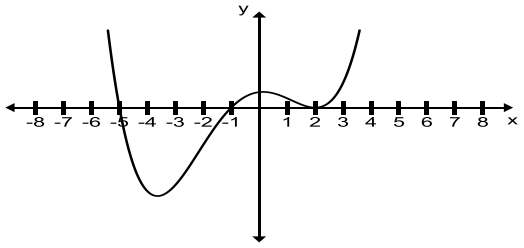
C. $P(x)$ has one distinct positive real root less than 2 with a multiplicity of 2.

5. $f(x)=-x^2(x-2)^3(x+3)$

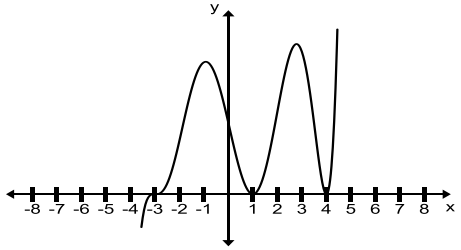
6. $f(x)=(x+4)^2(3x-1)$

III. Write equations for the graphs shown here.

7.

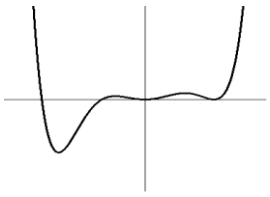



8.

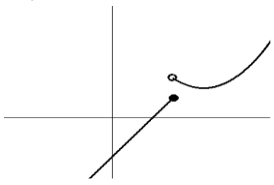



IV. Identify as continuous or discontinuous.

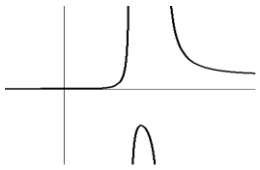
9.



10.



11.



V. Describe the type of discontinuity (point, infinite, jump), if any, and the place of discontinuity.

12. $p(x)=\dfrac{x^2-1}{x^2-2x-3}$

13. $g(x)=\dfrac{3x^2-75}{x-5}$

14. $f(x)=2[\![x+3]\!]$

15. $p(x)=\begin{cases}2x-4, & x<4\\ (x-2)^2, & x\geq 4\end{cases}$

VI, State all the asymptotes… vertical, horizontal, and slant (if any).

16. $g(x)=\dfrac{2x-3}{7x+10}$

17. $h(x)=\dfrac{x^2+3x-4}{x+4}$

18. $f(x)=\dfrac{3x-27}{x^2+3}$

VII. Evaluate.

| | | | |
|---|---|---|---|
| 19. $-64^{\frac{3}{2}}$ | 20. $\frac{1}{\sqrt[5]{243^4}}$ | 21. $-32^{\frac{3}{5}}$ | 22. $\sqrt[3]{(-2)^6}$ |

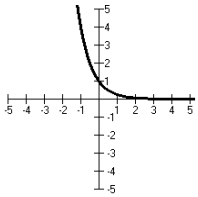
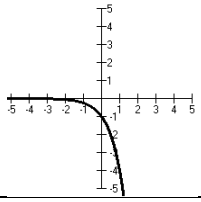
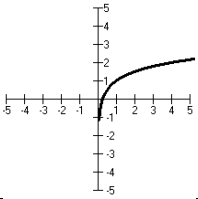
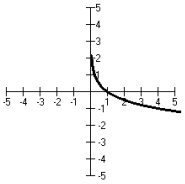
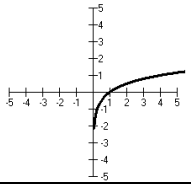
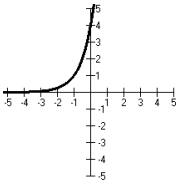
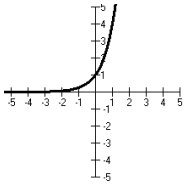
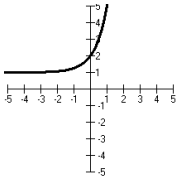
VIII. Solve for the variable.

| | | | |
|---|---|---|---|
| 23. $4^{2x}=16^{3x-2}$ | 24. $36^x=\sqrt{6}$ | 25. $\left(\frac{1}{81}\right)^x=3^{5x+4}$ | 26. $4^{x-2}=\frac{1}{128}$ |

IX. Match the equation with its graph. DO THIS WITHOUT THE CALCULATOR!

27. $y=\log_{\frac{1}{4}} x$ 28. $y=-4^x$ 29. $y=\left(\frac{1}{4}\right)^x$ 30. $y=4^x$ 31. $y=\left(\frac{1}{4}\right)^{-x}$

32. $y=4^x+1$ 33. $y=\log_4 x+1$ 34. $y=\log_4 x$ 35. $y=4^{x+1}$ 36. $x=4^y$

| | | | |
|---|---|---|---|
| A.  | B.  | C.  | D.  |
| E.  | F.  | G.  | H.  |

X. Graph. Find domain, range, asymptote(s), intercepts, and whether increasing or decreasing.

| | |
|---|---|
| 37. $h(x)=\log_2(x-2)+1$ | 38. $y=-\log_4(x+2)$ |

XI. Rewrite in logarithmic form. DO NOT SOLVE.

| | | |
|---|---|---|
| 39. $5^2=25$ | 40. $e^{-0.56}\approx .715$ | 41. $x^3=15$ |

XII. Rewrite in exponential form. DO NOT SOLVE.

| | | |
|---|---|---|
| 42. $\log_5 \frac{1}{25}=-2$ | 43. $\log 7\approx .903$ | 44. $\ln x=\frac{1}{5}$ |

XIII. Use the definition of logarithmic functions to evaluate each logarithm.

| | | |
|---|---|---|
| 45. $\log 0.001$ | 46. $\log_{\sqrt{3}} \frac{1}{9}$ | 47. $\log_8 2$ |
| 48. $\log_{\sqrt{3}} 27$ | 49. $\log_{\frac{1}{5}} 125$ | 50. $\log 1000$ |

XIV. Express each in simplified condensed form.

| | |
|---|---|
| 51. $7\log x^2-\log 16$ | 52. $\frac{1}{2}\log x-\frac{1}{4}\log 16y+2\log 2$ |

XV. Express each in expanded form.

| | |
|---|---|
| 53. $\log_b \frac{3x^4}{(5y)^3}$ | 54. $\log 5x^2\sqrt{y}$ |

**Pre-Calculus 5th 6 Weeks Test Review** **DO ON OWN PAPER.**

## Calculator Portion:

1. Use synthetic division to divide. Is $(x+1)$ a factor, why or why no?
$(3x^4+3x^2-2x-12)\div(x+1)$

2. Find $k$ such that the polynomial has the factor $(x-3)$.
$f(x)=2x^4-3x^3-4x^2-kx-15$

3. Use a graph to find the zeros and multiplicity, then rewrite in factored form.
$f(x)=x^4+9x^3+17x^2-33x-90$

4. Determine if the following are possible rational roots for $f(x)=8x^5+13x^4-16x^3+86x-15$.

$\frac{-3}{2}$ $-5$ **1** $\frac{3}{5}$ $\frac{-3}{4}$

5. Given the function
$f(x)=5x^6+3x^5+\ldots+6x-24$
Maximum number of possible roots: _____
Maximum number of possible relative extrema: ___
End behavior: _____

6. What would be the smallest possible degree of polynomial with the roots:
$\frac{-3}{2},\ \sqrt{6},\ i,\ 2-3i$

Find all the roots for the following polynomials. Give EXACT VALUES. Show your work. You may use your calculator to help you start.

7. $f(x)=x^3-12x^2-43x+210$

8. $f(x)=x^5-86x^3+564x^2-1467x+1404$

Determine if the functions have any of the following and if so, where. Holes, asymptotes (vertical, horizontal and/ slant), x-intercept, y-intercept, domain and range.

9. $g(x)=\frac{x+5}{x^2+2x-15}$

10. $t(x)=\frac{5x+2}{3x-1}$

11. $t(x)=\frac{x^2-36}{x+6}$

12. $h(x)=\frac{4x^2-5x-2}{x-2}$

Evaluate with the calculator. Round to the nearest thousandth.

13. $150^{\frac{3}{4}}$

14. $(-249)^{\frac{2}{3}}$

15. $\sqrt[5]{221^3}$

Simplify. NO NEGATIVE EXPONENTS! NO DECIMALS! SHOW YOUR WORK (use separate sheet if needed).

16. $\frac{(-4x^3y^{-3})^{-2}}{x^{-1}y^2}$

17. $\left(\frac{81x^6y^{-4}}{z^{-3}}\right)^{\frac{3}{2}}$

18. $x^{-\frac{4}{5}}\left(-3x^{\frac{6}{5}}y^3\right)^2$

19. $\sqrt[4]{\sqrt{\frac{x^{-16}y^{10}}{z^{-4}}}}$

Use your calculator to evaluate to the nearest hundredth.

20. $\log 0.0786$

21. $\ln 45.44$

22. $\ln x=-0.8798$

23. $\log x=4.5$

Solve each equation. Round to the nearest hundredth when necessary.

24. $72=2x^4$

25. $\log_{36} x=-\frac{3}{2}$

26. $\log x=-4.15$

27. $4^{3x+5}=25$

29. $4e^{2x+3}-1=15$

Solve.

30. Find how long it takes for an investment to double in value at 7% interest compounded continuously.

31. One method used to determine the value of an item after $t$ years is to use the depreciation formula $V=V_0(1-r)^t$, where $V$ is the final value of the item, $V_0$ is the original value, and $r$ is the rate of depreciation. Determine in how many years a $15,000 truck will be worth less than $2000 if it depreciates at a rate of 22% per year.