

Precalculus: Quarter 2 Review A

You should be able to solve all of the problems on this review **without using a calculator.**

Simplify.

1. $(2x^4y^{-2})^3$
 $8x^{12}y^{-6} = \frac{8x^{12}}{y^6}$

2. $\frac{3x^7y^2}{9xy^{-4}} \cdot \frac{12x^{-1}y^0}{3xy^6} = \frac{3 \cancel{6} x^6 y^2}{2 \cancel{1} x^2 y^2} \cdot \frac{4x^4}{3}$

3. $12^{\frac{2}{3}}$
 $\sqrt[3]{12^2} = 2\sqrt[3]{18}$

Solve the equations.

4. $3x - 4 = 6x + 5$
 $-3x \quad -3x$
 $-4 = 3x + 5$
 $-5 \quad -5$
 $-9 = 3x$
 $x = -3$

5. $x(2x+5) = 4(x+7)$
 $2x^2 + 5x = 4x + 28$
 $-4x \quad -28 \quad -4x \quad -28$
 $2x^2 + x - 28 = 0$
 $(2x - 7)(x + 4)$
 $x = 7/2, x = -4$

6. $|4x+1| = 3$
 $4x+1 = 3 \quad 4x+1 = -3$
 $4x = 2 \quad 4x = -4$
 $x = 1/2 \quad x = -1$

7. $3x - \frac{2}{x} = 5$
 $3x^2 - 2 = 5x$
 $3x^2 - 5x - 2 = 0$
 $(3x+1)(x-2)$
 $x = -1/3, x = 2$

8. $\frac{2}{x+3} + \frac{x}{x-1} = \frac{3}{x^2+2x-3}$
 $LC(D) = (x+3)(x-1)$
 $2(x-1) + x(x+3) = 3$
 $2x-2 + x^2+3x = 3$
 $-3 \quad -3$
 $x^2+5x-5 = 0$
 $x = \frac{-5 \pm \sqrt{25-4(1)(-5)}}{2(1)} = \frac{-5 \pm \sqrt{45}}{2}$

9. $0 = \frac{2x-1}{x^2+6x-7}$
 $2x-1 = 0$
 $x = 1/2$

Solve the inequalities.

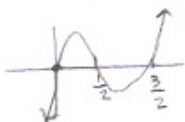
9. $5x+1 \geq 2x-4$
 $-2x \quad -2x$
 $3x+1 \geq -4$
 $3x \geq -5$
 $x \geq -5/3$

10. $x^2+9x+20 < 0$
 $(x+5)(x+4) < 0$
 $x = -5, -4$
 $(-5, -4)$

11. $|6x+5| - 3 > 7$
 $+3 \quad +3$
 $|6x+5| > 10$
 $6x+5 > 10 \quad 6x+5 < -10$
 $6x > 5 \quad 6x < -15$
 $x > 5/6 \quad x < -5/2$

12. $4x^3 - 8x^2 + 3x \leq 0$
 $x(4x^2 - 8x + 3)$
 $x(2x-1)(2x-3)$
 $x = 0, 1/2, 3/2$
 $(-\infty, 0] \cup [1/2, 3/2]$

13. $x^2+2 < 0$
 no solution



Describe the end behavior of the polynomial function using $\lim_{x \rightarrow \infty} f(x)$ and $\lim_{x \rightarrow -\infty} f(x)$.

14. $f(x) = 3x^4 - 5x^2 + 3$ \uparrow
 $\lim_{x \rightarrow \infty} f(x) = +\infty$
 $\lim_{x \rightarrow -\infty} f(x) = +\infty$

15. $f(x) = -x^3 + 7x^2 - 4x + 3$ \downarrow
 $\lim_{x \rightarrow \infty} f(x) = -\infty$
 $\lim_{x \rightarrow -\infty} f(x) = +\infty$

Find the zeros of the functions.

16. $f(x) = x^2 + 2x - 8$
 $(x+4)(x-2)$
 $x = -4, 2$

17. $f(x) = x^3 - 25x$
 $x(x^2 - 25)$
 $x(x+5)(x-5)$
 $x = 0, -5, 5$

18. $f(x) = x^2 + 9x + 20$
 $(x+5)(x+4)$
 $x = -5, -4$

19. $f(x) = x^3 + 4x^2 + x - 6$
 $\pm \frac{6}{1} = \pm 1, 2, 3, 6$
 $\begin{array}{r} 1 \mid 1 \ 4 \ 1 \ -6 \\ \downarrow 1 \ 5 \ 6 \\ 1 \ 5 \ 6 \ 0 \end{array}$
 $x^2 + 5x + 6 = 0$
 $(x+2)(x+3)$
 $x = -2, -3$

Zeros: $1, -2, -3$

21. If $x = 2$ is a zero of $f(x) = x^3 + 6x^2 - 19x + 6$ find all other zeros.

$$\begin{array}{r} 2 \mid 1 \ 6 \ -19 \ 6 \\ \downarrow 2 \ 16 \ -6 \\ \hline 1 \ 8 \ -3 \ 0 \end{array}$$

$x^2 + 8x - 3$

$$x = \frac{-8 \pm \sqrt{64 - 4(1)(-3)}}{2(1)}$$

$$\frac{-8 \pm \sqrt{64+12}}{2} = \frac{-8 \pm \sqrt{76}}{2} = \frac{-8 \pm 2\sqrt{19}}{2} = -4 \pm \sqrt{19}$$

Find the horizontal and vertical asymptotes of each rational function.

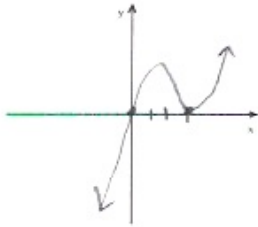
22. $f(x) = \frac{3}{x-2}$
 vert: $x = 2$
 hor: $y = 0$

23. $f(x) = \frac{4x^2 + 5}{x^2 + 7x + 10}$
 $(x+2)(x+5)$
 vert: $x = -2, -5$
 hor: $y = 4$

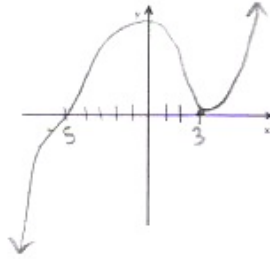
24. $f(x) = \frac{2x+7}{x^2-16}$
 ver: $x = 4, -4$
 hor: $y = 0$

Sketch each function.

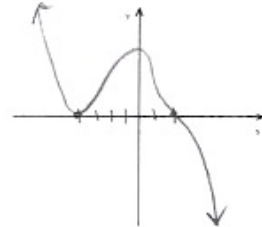
25. $f(x) = x(x-3)^2$



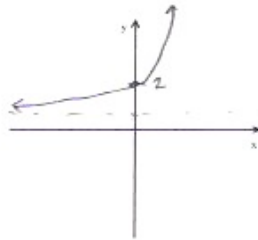
26. $f(x) = (x-3)^2(x+5)^3$



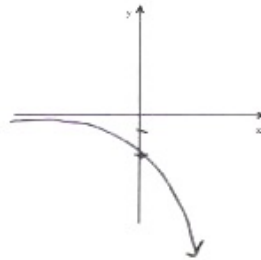
27. $f(x) = -7(x-2)^3(x+4)^2$



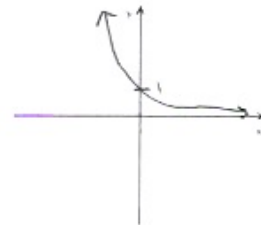
28. $f(x) = e^x + 1$



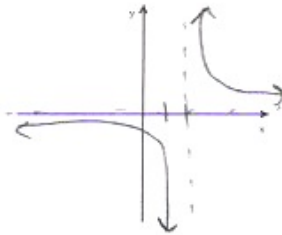
29. $f(x) = -2e^x$



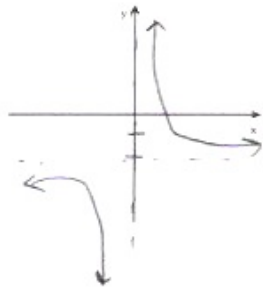
30. $f(x) = \frac{1}{2}x$



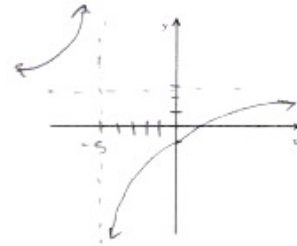
31. $f(x) = \frac{5}{x-2}$



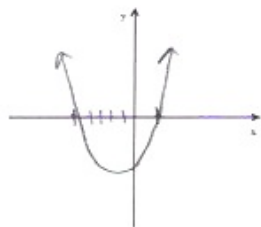
32. $f(x) = \frac{1}{x} - 2$



33. $f(x) = \frac{3x-2}{x+5}$ $f(0) = -\frac{2}{5}$



34. $f(x) = (x-1)(x+5)$



35. $f(x) = -|x+2| + 4$

