Trashketball

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1. Write the equation of a quadratic function in vertex form that has a vertex at (-1, -2) and passes through (-3, 10).

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$y=a(x-h)^2+k$

$10=a(-3+1)^2-2$

$10=a(4)-2$

$12=4a$

$3=a$

$\boxed{f(x)=3(x+1)^2-2}$

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2. For $f(x)=3(x+1)^2-2$, find where f(x)<0. Round to 2 decimals.

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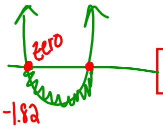

f(x)<0: (-1.82, -0.18)

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3. Your factory produces lemon-scented air fresheners. The guy in accounting says that the cost for producing x thousands of units a day can be approximated by the formula, $C=0.04x^2-8.504x+25302$. What daily production will minimize your costs?

Vertex

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3. Your factory produces lemon-scented air fresheners. The guy in accounting says that the cost for producing x thousands of units a day can be approximated by the formula, $C=0.04x^2-8.504x+25302$. What daily production will minimize your costs?

106.3 thousand units
or
106,300 units

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4. Write x^4+x^2-12 as the...

a) product of factors that are irreducible over the rationals

b) product of factors that are irreducible over the reals

c) completely factored

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a) product of factors that are irreducible over the rationals

b) product of factors that are irreducible over the reals

c) completely factored

a) $(x^2+4)(x^2-3)$
b) $(x^2+4)(x-\sqrt{3})(x+\sqrt{3})$
c) $(x+2i)(x-2i)(x-\sqrt{3})(x+\sqrt{3})$

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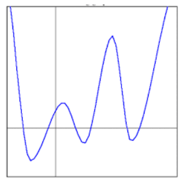
5. Use the graph of the polynomial function to determine whether the degree is even or odd, the leading coefficient is positive or negative, and the end behavior.

As $x \to \infty$
$f(x) \to$

As $x \to -\infty$
$f(x) \to$



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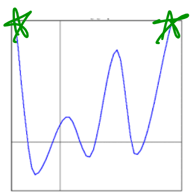
5. Use the graph of the polynomial function to determine whether the degree is even or odd, the leading coefficient is positive or negative, and the end behavior.

degree: even
lead coeff: +
As $x \to \infty$, $f(x) \to \infty$
As $x \to -\infty$, $f(x) \to \infty$



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6. Given $f(x)=-x^4+4x^2-3x-1$, use the Intermediate Value Theorem to show a zero exists on the interval [-3, -2].

$f(-3) =$
$f(-2) =$

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6. Given $f(x)=-x^4+4x^2-3x-1$, use the Intermediate Value Theorem to show a zero exists on the interval [-3, -2].

$\boxed{\begin{array}{l} f(-3)=-(-3)^4+4(-3)^2-3(-3)-1=-37 \\ f(-2)=-(-2)^4+4(-2)^2-3(-2)-1=\cancel{13}\ 5 \\ \text{Yes, there's a zero by IVT,} \\ \text{since } f(-3)=-37<0<\cancel{13}\ 5=f(-2) \end{array}}$

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7. Write a polynomial in standard form that has the zeros $-1, 3-\sqrt{2}, 3+\sqrt{2}$

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$(x+1)(x-3+\sqrt{2})(x-3-\sqrt{2})$

$\boxed{f(x)=x^3-5x^2+x+7}$

$x^2-3x-\cancel{\sqrt{2}x}-3x+9+\cancel{3\sqrt{2}}+\cancel{\sqrt{2}x}-\cancel{3\sqrt{2}}-2$

$(x+1)(x^2-6x+7)$

$x^3-6x^2+7x+x^2-6x+7$

x^3-5x^2+x+7

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8. Given the following factors of $f(x)$, find the remaining factors and write the complete factorization for $f(x)$. Then list all real zeros of $f(x)$.

$f(x) = x^4+x^3-5x^2-3x+6$; factors: (x-1), (x+2)

$\begin{array}{r|rrrrr} 1 & 1 & 1 & -5 & -3 & 6 \\ & & 1 & 2 & -3 & -6 \\ \hline -2 & 1 & 2 & -3 & -6 & 0 \\ & & -2 & 0 & 6 & \\ \hline & 1 & 0 & -3 & 0 & \end{array}$

x^2-3

$\boxed{(x+\sqrt{3})(x-\sqrt{3})(x-1)(x+2)}$

$x=\pm\sqrt{3}, 1, -2$

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8. Given the following factors of $f(x)$, find the remaining factors and write the complete factorization for $f(x)$. Then list all real zeros of $f(x)$.

$f(x) = x^4+x^3-5x^2-3x+6$; factors: (x-1), (x+2)

factored: $(x-1)(x+2)(x-\sqrt{3})(x+\sqrt{3})$

zeros: $1, -2, \sqrt{3}, -\sqrt{3}$

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9. List all the possible rational zeros of f. Then determine all the real rational zeros of f.

$f(x)=\underbrace{4}_{q}x^3-15x^2-7x+\underbrace{12}_{p}$

$\frac{p}{q}: \frac{\pm 1 \ \pm 2 \ \pm 3 \ \pm 4 \ \pm 6 \ \pm 12}{\cancel{\pm 1} \ \cancel{\pm 2} \ \pm 4}$

$\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12, \pm \frac{1}{2}, \pm \frac{3}{2}, \pm \frac{1}{4}, \pm \frac{3}{4},$

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9. List all the possible rational zeros of f. Then determine all the real rational zeros of f.

$f(x)=4x^3-15x^2-7x+12$

$possible: \pm\frac{1}{4}, \pm\frac{1}{2}, \pm\frac{3}{4}, \pm 1, \pm\frac{3}{2} \pm 2, \pm 3, \pm 4, \pm 6, \pm 12$

$real: -1, \frac{3}{4}, 4$

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10. Determine the domain for $f(x)=\frac{x-1}{x^2-x-6}$

$x^2-x-6=0$

$(x-3)(x+2)=0$

$x \neq 3 \quad x \neq -2$

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10. Determine the domain for $f(x)=\dfrac{x-1}{x^2-x-6}$

$\boxed{\begin{array}{c} x \neq -2, 3 \\ \text{OR} \\ (-\infty, -2)\cup(-2, 3)\cup(3,\infty) \end{array}}$

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11. Determine the slant asymptote for $f(x)=\dfrac{x^2+3x-4}{x+3}$

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$$\begin{array}{r|rrr} -3 & 1 & 3 & -4 \\ & & -3 & 0 \\ \hline & 1 & 0 & -4 \end{array}$$

$y=x+0$

$y=x$

$\boxed{y = x}$

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12. For $f(x)=\dfrac{x^2+1}{x^2-9}$, find all of the asymptotes, identify domain and range, and state where $f(x)>0$.

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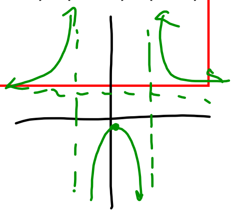
12. For $f(x) = \dfrac{x^2+1}{x^2-9}$, find all of the asymptotes, identify domain and range, and state where $f(x)>0$.

V.A.: x = -3,3
H.A: y = 1
Domain: $x \neq -3,3$ or $(-\infty,-3)\cup(-3,3)\cup(3,\infty)$
Range: $(-\infty,-\frac{1}{9}]\cup(1,\infty)$
f(x)>0: $(-\infty,-3)\cup(3,\infty)$



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Feb 9-10:09 AM