BECA/Huson/Algebra 2: Regents Preparation Name:
6 June 2024

Prep #24 Exponential regression

Casio instructions: `https://www.youtube.com/watch?v=jcX93Grn8o8`

Menu > Stat > enter data in List 1 and List 2
> Calc (F2) > REG (F3) > (F6) > EXP (F2) > abˆX (F2)

1. Consider the data in the table below.

x	1	2	3	4	5	6
y	3.9	6	11	18.1	28	40.3

State an exponential regression equation to model these data, rounding all values to the *nearest thousandth*.

2. A cup of coffee is left out on a countertop to cool. The table below represents the temperature, $F(t)$, in degrees Fahrenheit, of the coffee after it is left out for t minutes.

t	0	5	10	15	20	25
$F(t)$	180	144	120	104	93.3	86.2

Based on these data, write an exponential regression equation, $F(t)$, to model the temperature of the coffee. Round all values to the *nearest thousandth*.

3. Kelly-Ann has \$20,000 to invest. She puts half of the money into an account that grows at an annual rate of 0.9%. At the same time, she puts the other half of the money into an account that grows continuously at an annual rate of 0.8%. Write an equation that represents the value of Kelly-Ann's investments after t years.

4. An investment of \$5000 grows at an annual rate of 3.5% compounded monthly.

$$P(t) = 5000(1 + \frac{0.035}{12})^{12t}$$

(a) Find the investment value after 10 years.

(b) Determine the time for the investment value to double, to the *nearest month*.

5. The table below gives air pressures in kPa at selected altitudes above sea level measured in kilometers.

x	Altitude (km)	0	1	2	3	4	5
y	Air Pressure (kPa)	101	90	79	70	62	54

Write an exponential regression equation that models these data rounding all values to the *nearest thousandth*.

Use this equation to algebraically determine the altitude, to the *nearest hundredth* of a kilometer, when the air pressure is 29 kPa.

BECA/Huson/Algebra 2: Regents Preparation Name:
6 June 2024

6. Expand and simplify each complex expression.

   (a) $6xi^3(-4xi + 5)$

   (b) $(x + 3i)^2 - (2x - 3i)^2$

7. Solve each equation. Express the answer in $a + bi$ form.

   (a) $2x^2 + 5x + 8 = 0$

   (b) $5x^2 - 2x + 13 = 9$

8. Find the solution set of each equation (round to the *nearest tenth*).

   (a) $\dfrac{2}{3x+1} = \dfrac{1}{x} - \dfrac{6x}{3x+1}$

   (b) $\dfrac{1}{1-x^2} = -|3x - 2| + 5$

9. Over the set of integers, factor completely $x^4 - 5x^2 + 4$.

10. Determine which expressions are equivalent to $\dfrac{x^4 - 5x^2 + 4x + 14}{x + 2}$.

    (hint: substitute $x = 0$ and $x = 1$)

    (a) $x^3 - 2x^2 - x + 6 + \dfrac{2}{x+2}$

    (b) $x^3 - 5x + 4 - \dfrac{14}{x+2}$

    (c) $x^3 + 2x^2 - x + 2 + \dfrac{18}{x+2}$

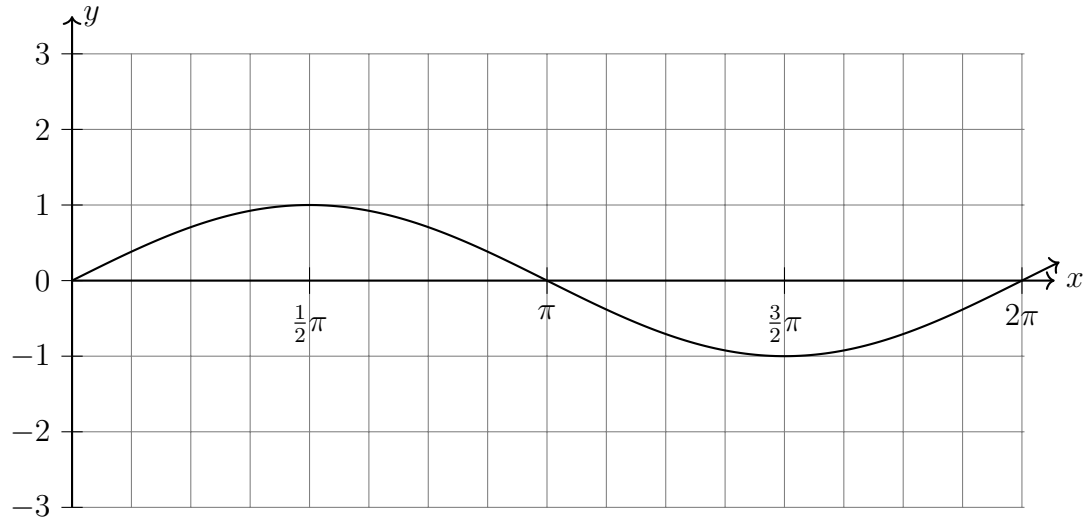
    (d) $x^3 + 2x^2 - 9x + 22 - \dfrac{30}{x+2}$

11. Given $a > 0$, solve the equation $a^{x+1} = \sqrt[3]{a^2}$ for x algebraically.

BECA/Huson/Algebra 2: Regents Preparation Name:
6 June 2024

Prep #24 Periodic functions

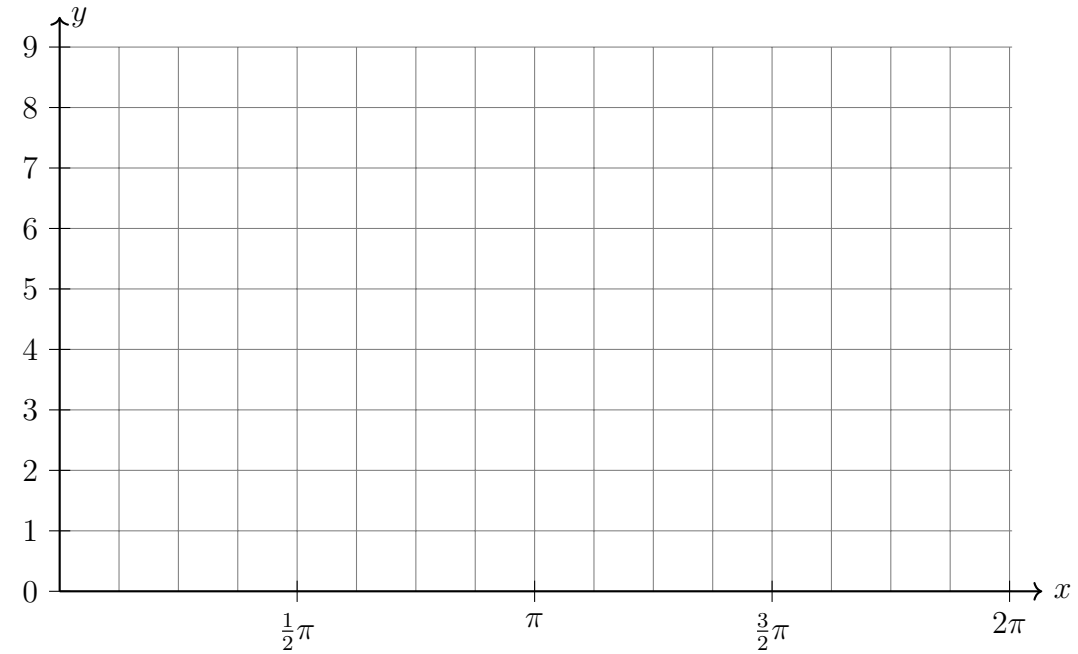
12. The function $f(x) = \sin x$ is shown on the graph below.



(a) A second periodic function $g(x)$ has an amplitude of 2. Graph $g(x) = 2\sin x$ on the same set of axes as $f(x)$.

(b) Find $g(\frac{3}{4}\pi)$ as an exact value. Mark the point on the graph and label it as an ordered pair.

13. Graph the function $f(x) = 3\sin x + 5$. Draw and label the midline of f, $y = 5$.

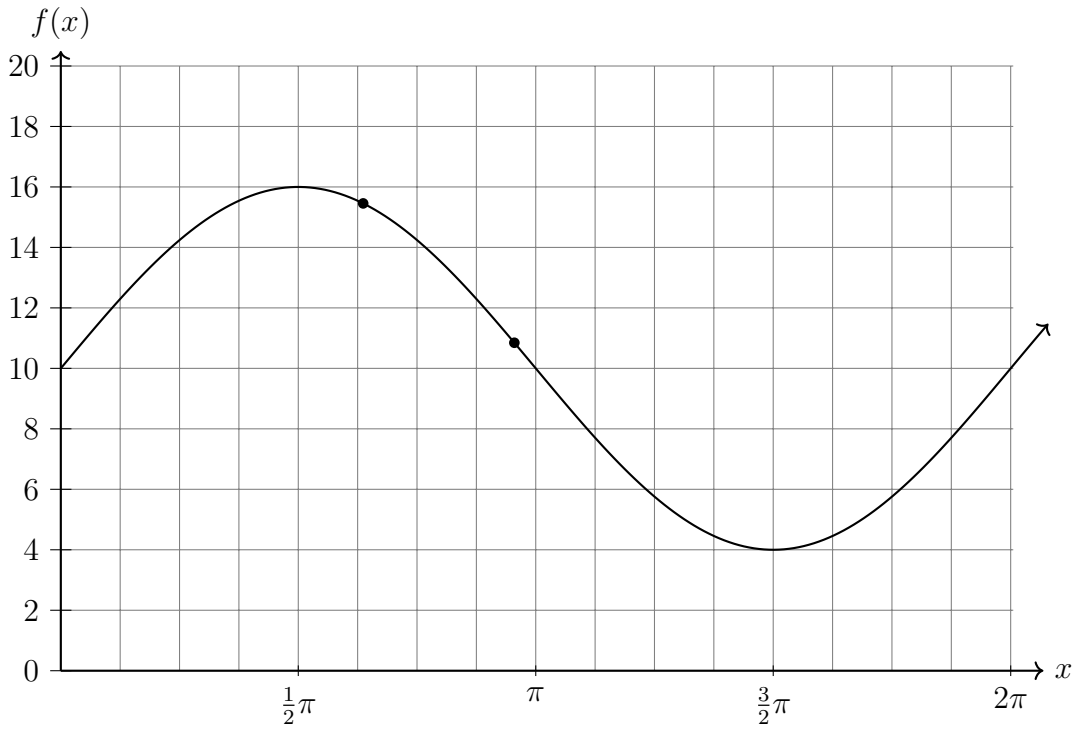


14. A periodic function $f(x)$ is shown on the graph below.

    (a) Draw and label as an equation the midline of f.

    (b) Mark the maximum and minimum points of f over the graphed domain, and label them as ordered pairs.

    (c) Write down an equation for the function in the form $f(x) = A\sin x + D$.



    (d) Find the average rate of change of $f(x)$ over the interval $2 < x < 3$ rounded to the *nearest hundredth*.