AP Precalc

Write your questions and thoughts here!

1.13 Function Model Selection

1.13 Notes

Selecting Models

Look at context, data, graphs and select the appropriate function to model the situation.
Models may have restricted domain and range!!!

Bean

day	1	2	3	4	5	6
stamps	15	20	25	30	35	40

Kelly

day	1	2	3	4	5	6
stamps	6	8	12	18	26	36

Sully

day	1	2	3	4	5	6
stamps	8	13	30	65	124	213

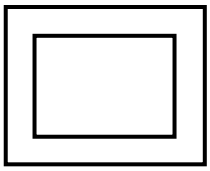
Brust

day	1	3	4	5	7	8
stamps	83	89	92	95	101	104

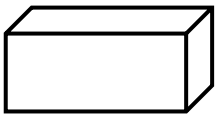
Geometry

Perimeter

Area



Volume



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Restricted Domian and Range

A bottle rocket is set up on a picnic table. When the firework detonates it will shoot straight up and come back down. The height of the bottle rocket is modeled by $h(t) = -16t^2 + 64t + 3$ where *t* stands for time in seconds and *h* is height of the rocket in feet.

a. Find $h(2)$. What does it mean in this context?

b. What is the restricted domain?

c. What is the restricted range?

d. What is the average rate of change for the interval [2,3] ?

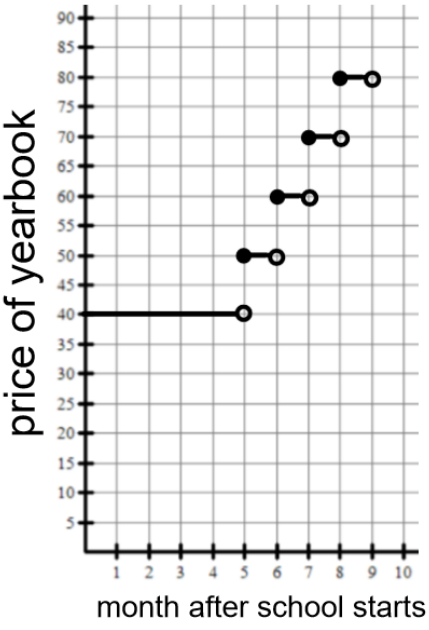
Piecewise Functions

The graph of f below shows the price of Generic High School yearbook. The yearbook sells for $40 the first 5 months of school. After that, the price increases every month.

a. What is the domain in this context?

b. What is the range in this context?

c. Find $f(5.5)$. What does it mean in this context?



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1.13 Function Model Selection

AP Precalculus

1.13 Practice

Select the appropriate model for the data (linear/quadratic/cubic). Explain why it models the data.

1.

x	1	2	3	4	5	6
y	4	15	50	121	240	419

2.

x	1	2	3	4	5	6
y	49	46	43	40	37	34

3.

x	1	2	3	4	5	6
y	119	110	95	74	47	14

4.

x	2	4	5	6	7	8
y	23	81	122	171	228	293

CALCULATOR ACTIVE. Use the model to answer the questions in context.

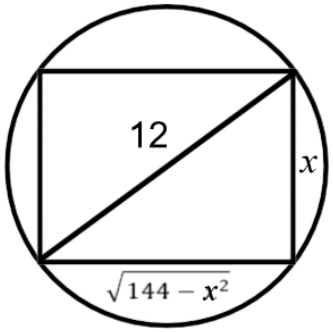
5. A patient receives a dose of painkiller. The function $p(t) = \frac{2t^2+10t}{t^3+1}$ models the amount of painkiller in the blood stream over time, where t is time in hours and p is painkiller in milligrams.

   a. Find $p(2)$. Explain your solution in context.

   b. What is the average rate of change from $t = 1$ to $t = 2$? Explain your solution in context.

   c. What is the maximum amount of painkiller in the patient's bloodstream?

6. A rectangle is inscribed in a circle with diameter of 12 cm. The width of the rectangle is x cm. The function $A(x) = x\sqrt{144 - x^2}$ models the area of the rectangle.



   a. What is the restricted domain of the function?

   b. What is the restricted range of the function?

   c. What is the maximum area of the rectangle?

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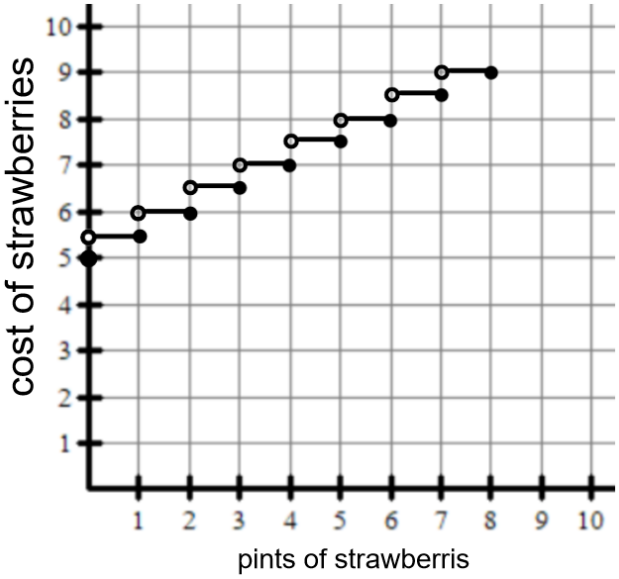
Use the graph of the piecewise function to answer the questions in context.

7. Generic Strawberry Fields allows customers to pay $5 to pick strawberries plus 50 cents for every pint or partial pint of strawberries that they pick. There is a limit of 8 pints per customer. The piecewise function f shown below models the price of strawberries picked.

a. What is the domain in this context?

b. The range can be represented by $y = 5 + 0.5x$ where x is all integers in the domain. Explain why.

c. Find $f(3.5)$. What does it mean in this context?



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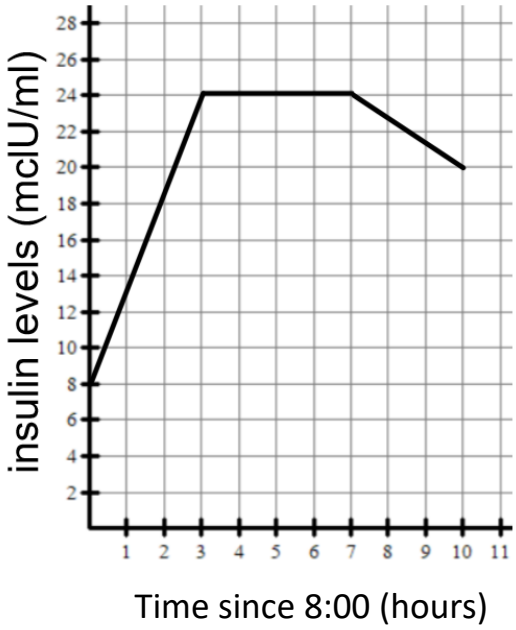
8. The piecewise function f shown below models the insulin levels of a patient over time where $x = 0$ represents 8:00.

a. What is the domain in this context?

b. What is the range in this context?

c. Find $f(3)$. What does it mean in this context?

d. Find average rate of change from [0, 3]. Explain the meaning in this context.



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1.13 Function Model Selection

1.13 Test Prep

Multiple Choice - CALCULATOR ACTIVE

For questions 9 and 10, use the table of values for polynomial *f* at selected values of *x*.

x	2	4	6	8	10	12
$f(x)$	97	405	977	1861	3105	4757

9. Which of the following statements are true ?

(A) The function is quadratic because the second differences are a nonzero constant.

(B) The function is quadratic because the third differences are a nonzero constant.

(C) The function is cubic because the second differences are a nonzero constant.

(D) The function is cubic because the third differences are a nonzero constant.

10. The average rate of change from $x = -22$ to $x = 4$ is 34. Which statement best describes the $f(x)$?

(A) There must be at least one zero on the interval $[-22, 4]$ because $f(-22)$ is negative.

(B) The number of zeros on the interval $[-22, 4]$ cannot be determined because $f(-22)$ is positive.

(C) There must be at least one zero on the interval $[-22, 4]$ because the average rate of change is negative.

(D) There is at least one zero in that interval$[-22, 4]$ because the average rate of change is positive.

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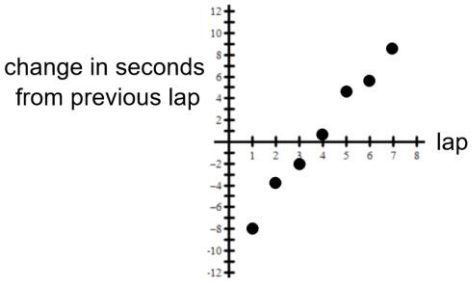
11. A track athlete is running laps. The graph shows the average rate of change from the previous lap.



A function model *T* is constructed for the time of each lap. Which of the following statements best supports the selection of the model of a model for *T*

(A) Since the rate of change is roughly linear, a linear model is best for *T*.

(B) Since the rate of change is roughly linear, a quadratic model is best for *T*.

(C) Since the rate of change is roughly linear, a cubic model is best for *T*.

(D) Since the rate of change is negative and positive, a quadratic model is best for *T*.

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