ALGEBRA II / ALG2-N01

A changing coolant temperature

Exponential and logarithmic models | threshold model

Name _____ Date _____

A constructed coolant model is T(t)=20+80(0.8)^t degrees Celsius after t whole minutes.

1. Explain the initial temperature and long-run level.

2. Find the first recorded minute at which T is below 50.

3. Explain why solving for a continuous threshold is only part of the answer.

Use evidence and show the relationships in your reasoning. Additional paper is permitted.

A platform that repeats

Periodic functions | sinusoidal model

Name _____ Date _____

A platform height is h(t)=7+3 sin(pi*t/6) meters, with t in seconds.

1. Find amplitude, midline and period.

2. Find the first positive time of maximum height.

3. Explain the difference between the pi/6 parameter and cycles per second.

Use evidence and show the relationships in your reasoning. Additional paper is permitted.

Exactly one inspection failure

Probability | event comparison

Name _____ Date _____

Two independent machines each have probability 0.2 of failing an inspection on a given day. Let F1 and F2 identify failures.

1. Find the probability that exactly one fails.

2. Find the probability that at least one fails.

3. State why the answers differ and identify the assumption enabling multiplication.

Use evidence and show the relationships in your reasoning. Additional paper is permitted.

ALGEBRA II / ALG2-N04

A randomized tutoring comparison

Inference and study design | simulation result

Name _____ Date _____

Forty volunteers are randomly assigned equally to two tutoring methods. The observed difference in mean improvement is +3 points for A minus B. A randomization model shuffles labels 200 times. Eight simulated differences are at least as extreme in absolute value as the observed difference.

1. Estimate the two-sided simulation tail proportion.

2. Explain what the random assignment supports.

3. Name a generalization limitation and explain why the simulation does not prove A helps every student.

Use evidence and show the relationships in your reasoning. Additional paper is permitted.

A canceled factor

Rational expressions | domain and equivalence

Name _____ Date _____

A student simplifies f(x)=(x^2-9)/(x-3) to g(x)=x+3.

1. State the domain restriction on f.

2. Evaluate both expressions at x=2 and discuss x=3.

3. Explain precisely where the formulas agree.

Use evidence and show the relationships in your reasoning. Additional paper is permitted.

A mean that hides a mixture

Distribution and model choice | two subgroup summaries

Name _____ Date _____

A service center has equal numbers of express jobs averaging 10 minutes and specialist jobs averaging 50 minutes. Each subgroup has little variation around its own mean.

1. Find the combined mean.

2. Explain why a single narrow normal model centered there could misrepresent the data.

3. Identify useful information for predicting an individual job duration.

Use evidence and show the relationships in your reasoning. Additional paper is permitted.