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Question: 1229

Which of the following best differentiates a special cause from a common cause in a process behavior chart?

A. Variation that is inherent to the process, appearing as a stable predictable pattern
B. A non-random variation that can be assigned to a specific source
C. Variation due to operator error only
D. Variation that improves the process only

Answer: B

Explanation: A special cause is a variation that is non-random and can be traced to a specific, identifiable source outside the normal process, whereas common cause variation is inherent, stable, and predictable within the process.

Question: 1230

Cpk=1.67 centered, but Ppk=1.33 after 6mo data. Indicates:

A. 0.5σ drift
B. A&B
C. Normal
D. Instability

Answer: B

Explanation: Ppk lower signals between-subgroup variation/drift ~0.5σ equiv.

Question: 1231

Battery fab constraint variability σ=21%. LSS-TOC buffer/RL for σ=5%?

A. RL-optimized 1.3x + DOE
B. DOE
C. Buffer fixed
D. RL sim

Answer: D

Explanation: RL min Var(σ)=5%, throughput +37%.

Question: 1232

A Lean Six Sigma Master Black Belt is prioritizing solutions with the steps: score each solution on impact, effort, and risk, then multiply scores by corresponding weights. What best describes this technique?

A. Failure Modes and Effects Analysis
B. Pareto Chart Analysis
C. Weighted Multi-Criteria Decision Analysis
D. Root Cause Analysis

Answer: C

Explanation: Assigning scores and weights to multiple criteria and calculating weighted sums is characteristic of Weighted Multi-Criteria Decision Analysis used in solutions prioritization.

Question: 1233

Healthcare diagnostic scan times model 3-parameter Weibull (β=2.8, η=25 min, γ=3 min), R(40 min)=0.41 links to patient throughput <80%, $250,000 overtime. Estimate kurtosis and design Control phase EWMA for scan variability to throughput KPIs.

A. 2.8, limits based on Weibull quantiles for wait <15 min
B. 3.2, exponentially weighted charts on tech fatigue for 90% utilization
C. 5.0, adaptive thresholds for peak hour adjustments
D. 5.9, integration with ARIMA for forecasting bottlenecks

Answer: A

Explanation: Weibull kurtosis = $6 + [\Gamma(1+1/\beta)]^4 / [\Gamma(1+2/\beta) - \Gamma^2(1+1/\beta)]^2 - 4\Gamma(1+1/\beta)^2 / [\Gamma(1+2/\beta) - \Gamma^2(1+1/\beta)]$, for β=2.8 . Leptokurtic tails exacerbate delays. Control EWMA with Weibull-derived UCL/LCL detects shifts, maintaining variability <10%, lifting throughput to 90% and cutting $250,000 overtime via staffing optimizations.

Question: 1234

Which of the following best describes the primary purpose of the project charter in Lean Six Sigma?

A. To serve as a formal agreement outlining team member responsibilities
B. To document the detailed process maps and control plans
C. To provide a high-level overview of project objectives, scope, and resources
D. To record the tactical steps for project execution

Answer: C

Explanation: The project charter offers a high-level summary that defines objectives, scope, and resource commitments, guiding the team and aligning stakeholders throughout the project lifecycle.

Question: 1235

Skewed left defect rates data: 0.1%, 0.2%, 0.5%, 1.0%, 5.0% (outlier). Team plots boxplot identifying 5.0% as outlier (>Q3+3IQR). MBB advises retain for dispersion calc using what advanced metric over IQR?

A. Gini mean difference
B. Bowley's skewness coefficient
C. Adjusted Boxplot (Tukey fence)
D. Coefficient of variation (CV)

Answer: A

Explanation: Gini coefficient measures dispersion robust to outliers/skew via pairwise absolute differences/mean, ideal for rates. CV=sd/mean sensitive to skew. Bowley for asymmetry. Adjusted fences for ID only. Retain outlier if valid special cause; Gini ensures accurate Y variation for Poisson regression in Analyze.

Question: 1236

New service platform: Methodology?

A. DFSS IDOV
B. DMAIC
C. Lean
D. PDCA

Answer: A

Explanation: IDOV for service design optimization.

Question: 1237

Which is a critical assumption underlying the validity of factorial experiment results?

A. Independence of experimental runs due to randomization
B. Homogeneity of experimental units across blocks
C. Zero interaction between factors
D. Equal sample size for each factor level

Answer: A

Explanation: Independence of runs through randomization is fundamental to ensure unbiased, valid statistical inference.

Question: 1238

In a logistics route optimization, multiple linear regression on delivery time (Y) vs. distance X1, traffic index X2, vehicle age X3 yields collinear X1-X2 (VIF=6.2). For robust Analyze conclusions:

A. Apply PCA to combine X1-X2 into principal component
B. Center X1 and X2 (subtract means) to reduce multicollinearity
C. Eliminate X2 based on higher p-value
D. Proceed ignoring VIF threshold

Answer: A

Explanation: High VIF inflates SEs; PCA derives PC1 (80% variance from distance-traffic) as substitute predictor, refitting $\hat{Y}=20 + 1.1PC1 + 0.5X3$ with VIF<2 and comparable $R^2=0.85$, preserving causal insight without bias. This verifies combined route factors' impact, guiding Improve's GPS rerouting for 20% time savings, advanced technique for Analyze in correlated logistics data.

Question: 1239

When constructing a SIPOC, which of the following should be identified first?

A. Process outputs
B. Suppliers
C. Customers
D. Process steps

Answer: B

Explanation: Suppliers are identified first, followed by their Inputs, then the Process steps, Outputs, and finally the Customers who receive the outputs, ensuring logical flow from supply to demand.

Question: 1240

Skew=-1.5 left, mode>median>mean. Central tendency for SIPOC Y?

A. Mode
B. Mean
C. Geometric
D. Median

Answer: D

Explanation: Median best represents typical in left skew (low outliers).

Question: 1241

A Master Black Belt coaching multiple LOBs in Pre-Define phase must differentiate EWV project

prioritization. Given two projects: EWV-Cross (NPV $2.8M, IRR 16%, strategic alignment score 95/100, risk σ=12%); LOB-Silo (NPV $1.9M, IRR 22%, alignment 65/100, σ=8%). Hurdle: NPV>0, IRR>14%, alignment>80. Which selection matrix criterion elevates EWV-Cross per CLSSMBB-001 guidelines?

A. Payback period under 2.5 years for liquidity
B. Pure IRR ranking favors high-percentage returns
C. Composite score: NPVAlignment / σ prioritizes holistic impact
D. ROI without time value for simplicity

Answer: C

Explanation: CLSSMBB-001 Pre-Define emphasizes EWV's multi-criteria matrix integrating NPV (absolute value add), IRR (efficiency), alignment (strategic fit), and risk-adjusted σ (Monte Carlo volatility). Composite = (2.895)/12 ≈ 22.17 > (1.9*65)/8 ≈ 15.44, selecting Cross for enterprise synergies (e.g., 30% variance reduction across LOBs). LOB view over-relies on IRR, ignoring scale and strategy, leading to suboptimal portfolio returns.

Question: 1242

In a multiple linear regression model, what does a negative coefficient for a predictor imply in the Lean Six Sigma context?

A. There is no linear effect of this predictor
B. Increasing this predictor will increase the response variable
C. The predictor is not statistically significant
D. Increasing this predictor will decrease the process output

Answer: D

Explanation: A negative coefficient means the predictor has an inverse relationship with the response variable, thus increasing the predictor decreases the output measure.

Question: 1243

When mapping a process during data gathering, cycle time is:

A. The average time an item spends waiting in inventory
B. Time spent generating reports for customers
C. Time consumed by non-value-added activities only
D. The total time required to complete a process from start to finish

Answer: D

Explanation: Cycle time measures the total elapsed time for one unit to pass through the entire process, encompassing both value-added and non-value-added activities.

Question: 1244

For a hyperscale data center's cooling system redesign amid 2026 AI workload surge (PUE target <1.1), evaluate DMAIC vs DFSS in PPM: Feasibility (w=0.3), Innovation Need (w=0.4), Cost Avoided ($B, w=0.2), Risk (w=0.1). DFSS scores 9,10,8,7; DMAIC 8,4,9,9. Select top.

A. DFSS total 8.9
B. DMAIC total 7.5
C. Tie at 8.2
D. DMAIC total 8.1

Answer: A

Explanation: DFSS weighted: (9*0.3=2.7)+(10*0.4=4)+(8*0.2=1.6)+(7*0.1=0.7)=8.9; DMAIC (8*0.3=2.4)+(4*0.4=1.6)+(9*0.2=1.8)+(9*0.1=0.9)=6.7

Question: 1245

Which design strategy decreases run size but aliases some higher-order interactions with main effects?

A. Full factorial design
B. Randomized block design
C. Fractional factorial design
D. Repeated measures design

Answer: C

Explanation: Fractional factorial designs reduce the number of runs by confounding certain higher-order interactions with main effects or lower-order interactions.

Question: 1246

Which statement is true regarding replication in fractional factorial DOE?

A. Replication reduces the quality of the model
B. Replication eliminates the need for randomization
C. Replication introduces confounding into the design
D. Replication allows estimation of pure experimental error and improves response variability assessment

Answer: D

Explanation: Replicating experimental runs provides an unbiased estimate of random error, improving confidence in effect estimates and statistical tests.

Question: 1247

Aerospace composite curing times fit Rayleigh (β=2, η=120 min), but 3-parameter suspicion with γ=10 min yields F(t=150 min)=0.67, driving 11% rework at $60,000 per lot. Compute reliability at LSL=100 min and link to capability indices for rework KPIs.

A. 0.59, Cpu targeting via time studies for yield>97%
B. 0.71, Ppk enhancement on humidity controls for sigma>4
C. 0.51, Cpm adjustments via oven zoning for <3% rework
D. 0.48, Cpl focus on material preheat for cost variance reduction

Answer: C

Explanation: With γ=10, effective t=140 min, η=110 min adjusted; R(100 effective=90) = exp(-(90/110)^2)≈exp(-0.67)≈0.51. High F(150) indicates tail issues. Non-normal capability uses Weibull percentiles for Cpm, guiding oven zoning DOE to center process, cutting rework to <3% and $60,000 costs, aligned with yield KPIs exceeding 97%.

Question: 1248

Which of the following BEST describes an ordinal scale?

A. Data organized into categories with no order
B. Data providing rank order without consistent interval differences
C. Data measured with a true zero
D. Data allowing meaningful multiplication and division

Answer: B

Explanation: Ordinal scales rank order data but the intervals between ranks are not necessarily equal or meaningful.

Question: 1249

Resistance: 41% mid-managers to TOC deployment. Kotter Step 2: Vision. ADKAR Knowledge gap. Intervention yielding 60% buy-in?

A. Vision story + TOC sim (throughput +31%), Knowledge webinars
B. Data dumps
C. Executive mandate
D. Annual review

Answer: D

Explanation: Step 2 crafts emotional vision; TOC sim visualizes +31% (Q=rate*buffer), webinars fill Knowledge (+2.4). Buy-in: Pre-post Δ=60% (χ^2 p<0.01). Dumps dry, mandate backlash, review delayed—sim drives urgency.

Question: 1250

In a complex CBA for Improve phase deployment of blockchain in a cross-border payments system, expected to yield $4M in fraud reduction benefits over 3 years but incurring $2.8M setup costs plus $600K annual maintenance, with a 10% discount rate and sensitivity analysis showing ±15% benefit volatility from regulatory changes, what is the base-case IRR, and how does it compare to the hurdle rate of 12%?

A. 8.5%, below hurdle indicating deferral
B. 25.6%, far exceeds with low sensitivity risk
C. 11.1%, borderline requiring scenario tweaks
D. 18.2%, exceeds hurdle supporting advancement

Answer: D

Explanation: Internal rate of return (IRR) solves for r where NPV=0: Initial outflow -$2.8M, inflows $4M (year 1), $3.4M (year 2, net of maint.), $3.4M (year 3). Using iterative solver or Excel IRR function, base IRR ≈18.2%, surpassing the 12% hurdle, affirming project pursuit in volatile 2026 fintech landscapes. Sensitivity at ±15% yields IRR range 14.7%-21.7%, robust per CBA guidelines. This metric, complementing payback <2.5 years, quantifies blockchain's fraud sigma lift (from 3.2 to 4.8), justifying intangibles like trust enhancement. Below-hurdle cases would trigger Monte Carlo simulations for risk-adjusted decisions.

Question: 1251

According to the Kano Model, which feature category is characterized by causing dissatisfaction when absent but not increasing satisfaction when present?

A. Attractive (Excitement) Features
B. Basic (Must-Be) Features
C. Performance Features
D. Indifferent Features

Answer: B

Explanation: Basic (Must-Be) Features are expected by customers as a minimum standard; their absence causes dissatisfaction, but their presence is taken for granted and does not enhance satisfaction.

Question: 1252

In the Analyze phase, what is the purpose of performing a stepwise regression in a multiple regression model?

A. To sequentially add or remove predictors to optimize model fit
B. To evaluate the process sigma level

C. To sketch process flow maps
D. To calculate the mean cycle time

Answer: A

Explanation: Stepwise regression is an automated procedure to add or remove predictor variables based on statistical criteria (e.g., p-values) to find a parsimonious model that best explains the variation in the response variable.

Question: 1253

In a high-stakes automotive EV battery recycling initiative, the MBB team maps SIPOC for closed-loop process but identifies VOP variation (Cpk=1.12) exceeding VOC CTQ for "99.9% purity" (spec 98-100%). Integrating VOB sustainability mandates (net-zero by 2030), what scenario-based adjustment uses CTS prioritization?

A. Insert safety interlocks as process step 4, recalculating FMEA RPN<50
B. Expand COPIS outputs to include blockchain-certified recycled material certificates
C. Prioritize CTS "zero hazardous emissions" via fault tree analysis on inputs
D. Calculate process capability for CTC yield, targeting Cp >2.0 for cost recovery

Answer: C

Explanation: CTS (Critical to Safety) trumps CTQ/CTC in VOB-aligned risk matrix; scenario: VOP Cpk=1.12 risks 10k DPMO emissions defects. FTA quantifies top event prob (e.g., P=0.001 x 0.1=1e-4), driving SIPOC process refinement (step: real-time spectrometry). Post-improve Z= (USL-mean)/3σ >4.5 ensures VOB net-zero (emissions COPQ $50M avoided), with charter milestone: CTS validation via MSA GR&R<10%.

Question: 1254

EWV sensitivity: Base NPV $2.7M @12%. +/-10% CF variance: Optimistic $3.9M, Pessimistic $1.5M. Monte Carlo σ=0.45. Risk-adjusted NPV?

A. $2.7M
B. $2.4M
C. $2.1M (certainty equivalent)
D. $3.0M

Answer: C

Explanation: Risk-adjusted = Base - λσ (λ=1.3) ≈$2.7-0.6=$2.1M. EWV incorporates Tornado/Spider charts for Pre-Define robustness.

Question: 1255

Which characteristic best distinguishes a Rayleigh distribution from a 2-parameter Weibull distribution in reliability modeling?

A. The Weibull distribution is a special case of Rayleigh with shape parameter equal to 1
B. The scale parameter of Rayleigh distribution is variable and must be estimated
C. The Rayleigh distribution includes a location parameter representing delay to failure
D. The shape parameter of Rayleigh distribution is fixed at 2

Answer: D

Explanation: The Rayleigh distribution is a special case of the Weibull distribution where the shape parameter is fixed at 2. This property simplifies the failure rate behavior characterization in scenarios with linear increasing failure rates. Unlike Weibull which allows a shape parameter to vary, Rayleigh's fixed shape makes it distinct. The scale parameter must always be estimated for fitting, and the Rayleigh does not include a location parameter.

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