Take Quiz Exit

Question 2 2 pts

Suppose A and B are independent events in some sample space with a probability measure. Then A^c and B^c are independent.

- ✓ True
- False

Question 3 2 pts

Suppose A and B are events in some sample space with a probability measure with both $0 < \mathbb{P}(A) < 1$ and $0 < \mathbb{P}(B) < 1$. If $\mathbb{P}(A|B) = 1$ then $\mathbb{P}(B^c|A^c) = 1$.

- ✓ True
- False

Take Quiz Exit

Question 4 2 pts

Suppose X is a continuous random variable with cumulative probability function $F(x)$. If $a \leq b$ then $F(a) \leq F(b)$.

- ✓ True
- False

Question 5 2 pts

Suppose X is a continuous random variable with density function $f(x)$. The function $f(x)$ can never be greater than one.

- True
- ✓ False

Take Quiz Exit

Question 6 2 pts

Suppose X is a random variable and a, b are constants. Then $\mathbf{stdev}(aX + b) = |a| \cdot \mathbf{stdev}(X)$.

Here stdev(X) means standard deviation of X.

- ✓ True
- False

Question 7 2 pts

Suppose $X \sim B(m, p)$ and $Y \sim B(n, p)$ where $p \in (0, 1)$ and $m < n$. Then $\mathbf{var}\left(\frac{X}{m}\right) > \mathbf{var}\left(\frac{Y}{n}\right)$.

- ✓ True
- False

Take Quiz Exit

Question 8 2 pts

If X and Y are independent random variables then $\mathbb{E}(X \cdot Y) = \mathbb{E}(X) \cdot \mathbb{E}(Y)$.

- ✓ True
- False

Question 9 2 pts

If X and Y are independent random variables then $\mathbf{var}(X - Y) = \mathbf{var}(X) - \mathbf{var}(Y)$.

- True
- ✓ False

$\mathrm{Var}(X-Y) = \mathrm{Var}(1X + -1Y) = 1^2 \cdot \mathrm{var}(X) + (-1)^2 \cdot \mathrm{var}(Y) + 2(1)(-1)\mathrm{Cov}(X,Y)$ (relevant to Q15)

Question 10 2 pts

The correlation of two random variables is always between -1 and 1.

- ✓ True

Question 11 2 pts

Suppose Z is a standard normal variable. Then for all $a \neq 0$ we have $\mathbb{P}(a - 1 \leq Z \leq a + 1) < \mathbb{P}(-1 \leq Z \leq 1)$.

- True
- ✓ False

Question 12 2 pts

If the random variables $X_1, \ldots, X_n$ are iid standard normal then $\frac{X_1 + \cdots + X_n}{\sqrt{n}}$ is standard normal.

Q3) $P(A|B)=1 \Rightarrow P(B^c|A^c)=1$

true

$P(A|B)=1 \iff$ "if B happens, then A happens"

$\Rightarrow$ "if A does not happen, then B does not happen"

$\iff P(B^c|A^c)=1$

P Table

	B	B^c	
A	$P(B)$	?	$P(A)$
A^c	0	$P(A^c)$	$P(A^c)$
	$P(B)$	$P(B^c)$	1

$P(A^c) = P(A^c \cap B^c)$

& $P(A|B)=1 \iff 1 = \frac{P(A \cap B)}{P(B)}$

$\Rightarrow 1 = \frac{P(A^c \cap B^c)}{P(A^c)} = P(B^c|A^c)$

Q4) as you move to b from a, area will be larger by definition

Q10

standard normal $P(a-1 \leq z \leq a+1)$

Take Quiz

Exit

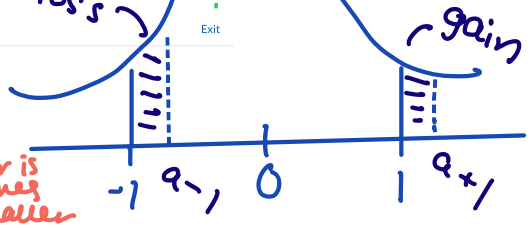
Question 12 2 pts

If the random variables $X_1, \ldots, X_n$ are iid standard normal then $\frac{X_1+\cdots+X_n}{\sqrt{n}}$ is standard normal.

- ✓ True
- False

$\bar{x} = \frac{X_1+\ldots+X_n}{n} \Rightarrow \sim N(0, \frac{1}{n})$ var is n-times smaller

soit $\sqrt{n}\,\bar{x} \sim N(0,1)$



gain $= P(-1 \le z \le 1) - P(-1 \le z \le a-1) + P(1 \le z \le a+1)$

Question 13 2 pts

If a hypothesis test rejects the null hypothesis at the 0.05 significance level, then it would also reject the null hypothesis at the 0.1 significance level.

- ✓ True
- False

[redacted]

Exit

Question 14 2 pts

Suppose the probability that an airline passenger is a no-show" (that is, he/she does not show up for a flight) is 0.1. To take advantage of this opportunity, an airline decides to sell 10 seats for a 9-seat plane, 20 seats for a 18-seat plane, and 30 seats for a 27-seat plane. Which of the three planes is the least likely to be overbooked?

(A plane is overbooked if it does not have enough seats for the passengers who show up.)

- ✓ The 9-seat plane
- The 18-seat plane
- The 27-seat plane
- All equally likely
- Cannot be determined
- None of the above

Q14) let X = shows (for 9-seat)

$X \sim B(10, 0.9)$

want P(overbooking)

$P(X > 9) = 1 - P(X \le 9)$

$= 1 - \text{binom.dist}(9, 10, 0.9, 1)$

$\text{Var}(x-y) = \text{Var}(x) + \text{Var}(y) + 2ab \cdot \text{cov}(x,y)$

Take Quiz

Exit

Question 15 2 pts

Suppose var(X+Y) = 10 and var(X-Y) = 6.

Find cov(X,Y). If the information is insufficient, write 999.

1

Q15) $\text{Var}(x+y) = \text{Var}(x) + \text{Var}(y) + 2ab \cdot \text{cov}(x,y)$

$10 = \text{var}(x) + \text{var}(y) + 2(1)(1)\,\text{cov}(x,y)$

$6 = \text{var}(x) + \text{var}(y) - 2(1)(-1)\,\text{cov}(x,y)$

sub+var+ system of equations

$4 = 0 \cdot \text{Var}(x) + 0 \cdot \text{var}(y) + 4 \cdot \text{cov}(x,y)$

$\Rightarrow 4 = 4 \cdot \text{cov}(x,y)$

$\Rightarrow \text{cov}(x,y) = \frac{4}{4} = 1$

Question 16 2 pts

Suppose you take a Probability exam that consists of 100 multiple-choice questions. Your level of mastery of the subject is so that you can answer each question correctly with probability 0.9. What is the probability that you answer at least 85 of the 100 questions correctly?

- 0.85
- 0.90
- ✓ 0.001
- 0.99
- None of the above.

Q16) let X = score on exam

$X \sim B(100, 0.9)$

want $P(X \ge 85) = 1 - P(X \le 84)$

$= 1 - \text{binom.dist}(84, 100, 0.9, 1)$

Take Quiz

Exit

Question 17 2 pts

Suppose calls arrive at a 1-800 phone line following a Poisson process with average arrival rate of 24 calls per hour.

Which of the following is NOT a correct way of computing the probability that at least one call arrives within the next 5 minutes?

- 1-poisson.dist(0,2,0) = 1 - dpois(0,2)
- 1-poisson.dist(0,2,1) = 1 - ppois(0,2)
- expon.dist(1,2,1) = pexp(1,2)
- ✓ expon.dist(5,12,1) = pexp(5,12)
- None of the above. In other words, all of the above are correct.

= 0 (reason)

Q18) $A = \{1 \le x \le 7\}$ $B = \{3 \le x \le 12\}$

$A \cup B = \{1 \le x \le 12\}$ $P(1 \le x \le 12) = F(12) - F(1)$

Question 18 2 pts

A continuous random variable X has cumulative distribution function F(x) and the range of values that it takes is from $-\infty$ to ∞. Let A be the event {1<= X <= 7 } and let B be the event {3 <= X <= 12}. What is $\mathbb{P}(A \cup B)$?

- ✓ F(12) - F(1)

Take Quiz — Exit

Question 18 — 2 pts

A continuous random variable X has cumulative distribution function F(x) and the range of values that it takes is from $-\infty$ to ∞. Let A be the event {1<= X <= 7} and let B be the event {3 <= X <= 12}. What is $\mathbb{P}(A \cup B)$?

- ✓ F(12) - F(1)
- F(7)-F(1)+F(12)-F(3)
- (F(7)-F(1))*(F(12)-F(3))
- (F(7)-F(1))/(F(12)-F(3))
- None of the above

Question 19 — 2 pts

Suppose you want to estimate the population proportion p via the sample proportion $\hat{p}$. Find the minimum number of samples that will guarantee a margin of error of 0.1 or less at the 0.95 confidence level?

97

Q19) MOE = $z_{0.05}\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \le 0.1$

* $z_{0.05} = 1.96$

$\Rightarrow \sqrt{n} \ge \frac{1.96 \cdot \sqrt{0.25}}{0.1} \Rightarrow$

* largest possible value of $\hat{p}(1-\hat{p}) = 0.25$ when $\hat{p} = 0.5$

$\sqrt{n} \ge 9.8$

$\Rightarrow n \ge 96.04$

Q20) heads first 3

Take Quiz — Exit

Question 20 — 2 pts

Consider the following experiment: You flip a fair coin repeatedly until the outcome is tails. What is the probability that you have to flip the coin at least four times?

0.125

$x = 4$

$\mathbb{P}(X=x) = (1-p)^{x-1}$ ✗ eliminate successes b/c I only need failures

$= (0.5)^3(0.5)$

Question 21 — 2 pts

The next two questions concern the following setup.

Suppose X is a normal random variable, the 0.1-quantile of X is 0.1, and the 0.9-quantile of X is 0.9.

Find the standard deviation of X.

(work below)

0.3121 =

=norm.inv(0.95,0.5,6)

Take Quiz — Exit

Question 22 — 2 pts

Find the 0.95-quantile of X.

1.0134

Q23) Standardizing always helps *

Question 23 — 3 pts

Suppose $X_1, \dots, X_n$ are iid standard normal and consider their sample mean $\overline{X} := \frac{X_1+\cdots+X_n}{n}$. Find the smallest n such that $|\overline{X}| \le 0.2$ with probability at least 0.95. In other words, find the smallest n such that $\mathbb{P}(|\overline{X}| \le 0.2) \ge 0.95$

96.04

also: $|\overline{x}| \le 0.2 \iff -0.2 \le \overline{x} \le 0.2$

$\mathbb{P}(|\overline{x}| \le 0.2) = \mathbb{P}(|\sqrt{n}\,\overline{x}| \le 0.2\sqrt{n}) \ge 0.95$

$n = ? \Rightarrow \mathbb{P}(|\overline{x}| \le 0.2) \ge 0.95$

$\overline{x} \sim N(0, \frac{1}{n}) \Rightarrow \sqrt{n}\,\overline{x} \sim N(0,1)$

standard normal

want: ≥ 0.95

$-0.2\sqrt{n}$ $\quad 0.2\sqrt{n}$

also: $|\sqrt{n}\,\overline{x}| \le 0.2\sqrt{n} \iff -0.2\sqrt{n} \le \sqrt{n}\,\overline{x} \le 0.2\sqrt{n}$

* standardization: $X \to \frac{X-\mu}{\sigma}$ always

$X \sim N(0, \frac{1}{n}) \to \frac{X-0}{\frac{1}{\sqrt{n}}} = \sqrt{n}X$

know: $-p = 0.95$

-1.96 $\quad 1.96$

$0.2\sqrt{n} \ge 1.96$

$\sqrt{n} \ge \frac{1.96}{0.2}$

$\sqrt{n} \ge 9.8 \Rightarrow n \ge (9.8)^2$

Take Quiz — Exit

Question 24 — 2 pts

The next three questions concern the following setup.

Suppose X is a discrete random variable that takes values $1, 2, \dots, 10$ with probability $1/10$ each.

Find $\mathbb{E}(X)$.

0.55

p $\quad q$ = p-quantile

$\mathbb{P}(X \le q) = p$

Question 25 — 2 pts

Find $\mathrm{var}(X)$.

② $\mathbb{E}\left(\frac{X_1+\dots+X_{100}}{100}\right) = 5.5$

Question 26 — 3 pts

Suppose $X_1, \dots, X_{100}$ are iid with the same distribution as X. Use the central limit theorem to compute the following probability approximately:

0.5138

③ $\mathrm{var}\left(\frac{X_1+\dots+X_{100}}{100}\right) = \frac{8.25}{100}$

CLT: ④ $\frac{X_1+\dots+X_{100}}{100} \sim N(5.5, \frac{8.25}{100})$ ⑤ $\cdot 100 \to N(550, 8.25)$

Question 27 — 2 pts

The next four questions, including this one, concern the following setup.

Suppose stocks A,B,C,D have annual expected returns and standard deviations as indicated in the following table:

	stock A	stock B	stock C	stock D
expected return	10%	14%	[illegible]	2%
standard deviation	10%	15%	20%	[illegible]

Q27) which has smallest tail? when 0 is farthest from μ in σ's

① $\mathbb{P}(5.3 \le \frac{X_1+\dots+X_{100}}{100} \le 5.7) \approx N$

② approx. N + use CLT

① norm.dist $\mathbb{P}(5.3 \le \frac{X_1+\dots+X_n}{100} \le 5.7)$

= norm.dist(5.7, 5.5, $\sqrt{0.0825}$, 1) − norm.dist(5.3, ...)

Continuous distributions:

t - tails are wider, w more random noise

Q21) $X \sim N(0.5, 6^2)$

Q19) MOE = Continuous random variables:

density f(x) (pdf)

a $\quad$ b

$\mathbb{P}(a \le X \le b) = F(b) - F(a)$

Cumulative distribution f(x)

x

$F(x) = \mathbb{P}(X \le x)$

Take Quiz

Question 27 — 2 pts

The next four questions, including this one, concern the following setup.

Suppose stocks A,B,C,D have annual expected returns and standard deviations as indicated in the following table:

	stock A	stock B	stock C	stock D
expected return	10%	14%	18%	22%
standard deviation	10%	15%	20%	25%

tail is smallest

Furthermore, suppose the annual returns are independent and have normal distribution.

Which one of the stocks is least likely to attain a negative return over the next year?

- ✓ Stock A
- Stock B
- Stock C
- Stock D
- None of the above

second-quantile / 0.5-quantile

(st.dev or var)

*task: find σ (or σ²)

norm.dist(0.9, 0.5, σ, 1) = 0.9 (method 1)

(method 2) use solver

(still Q21)

Q25) = sumproduct(expected return_i / variance_i, allocation_i)

Exit

Question 28 — 3 pts

Consider the following three possible allocations of capital to the above four stocks

Allocation 1: 50% stock A, 50% stock D

Allocation 2: 50% stock B, 50% stock C

Allocation 3: 25% stock A, 25% stock B, 25% stock C, 25% stock D

Compute the standard deviations of each of the above three allocations and write down the value of the smallest of them.

calc. 0.0919

*variance = allocation² · variance

- st. dev is still √calc. var

*size of quantiles depend on distance from μ

0.9-quantile = norm.s.inv(0.9) ⇒ z = 1.2816 (still Q21)

∴ 0.9 = 0.9-quantile of X

= μ + 1.2816σ

= 0.5 + 1.2816σ

$$\sigma = \frac{0.4}{1.2816} = 0.3121$$

Question 29 — 3 pts

For each of the above three allocations compute the "Sharpe ratio":

(expected return)/(standard deviation).

Write down the value of the largest of them.

1.7418 (all calc. ER are = but smallest σ²)

Q24)

Q30) = 1 − norm.dist(0.15, ER, σ², 1) (σ² given)

Take Quiz

Exit

Question 30 — 2 pts

Which of the above four stocks or three allocations is most likely to attain or exceed a target return of 15%?

- Stock A
- Stock B
- Stock C
- ✓ Stock D
- Allocation 1
- Allocation 2
- Allocation 3
- They all have the same chance or attaining or exceeding 15%

Linear Variable Combos: *notes*

E(aX + bY) = a E(X) + b E(Y)

Var(aX + bY) = a² · Var(X) + b² · Var(Y) + 2ab · Cov(X, Y)

= a² · Var(X) + b² · Var(Y) [Cov(X, Y) = 0]

*independent

Take Quiz

Exit

Question 31 — 2 pts

The next three questions, including this one, concern the following setup.

Suppose the Federal Reserve Chairman Jerome Powell announces that the Fed will increase the federal funds rate sometime in November, 2022 and the increase could occur at any moment. This means that the amount of time X (in days) between the beginning of the day on November 1, 2022 and the moment when the federal funds rate increase occurs is a uniform random variable with range of values [0,30]. In other words, X ~ U(0,30).

Find the probability that the Fed increases the federal funds rate before the end of the day on November 10, 2022.

0.3333

Cov(X, Y) = E((X − μ_X)(Y − μ_Y)) *notes*

= E(XY) − μ_X μ_Y

= E(XY) − E(X) · E(Y)

Q31) if X ~ U(a, b) = X ~ U(0, 30) then

$$F(x) \begin{cases} \frac{x-a}{b-a} & \text{if } a < x < b \end{cases}$$

$$\Rightarrow F(x) \begin{cases} \frac{10-0}{30-0} & \text{if } 0 < 10 < 30 \end{cases}$$

$$F(x) = P(X \le 10) = \frac{1}{3}$$

Question 32 — 2 pts

Find the probability that the Fed does not increase the federal funds rate before the end of the day on November 24, 2022.

0.2

Q32) X ~ U(0,30) & F(24) = P(X ≤ 24) ∴ P(do not increase)

$$\Rightarrow F(24) \begin{cases} \frac{24-0}{30-0} \end{cases} \Rightarrow P(X \le 24) = \frac{24}{30} = \frac{4}{5}$$

= 1 − P(X ≤ 24)

$\therefore 1 - P(X \le 24)$

$= 1 - \frac{4}{5} = \frac{1}{5}$

Take Quiz Exit

Question 33 2 pts

Suppose the Fed does not increase the federal funds rate before the end of the day on November 10, 2022. Given that information and assuming Powell's original announcement will hold, find the probability that the Fed does not increase the federal funds rate before the end of the day on November 24, 2022.

0.3333

Q33) the new $X = 24 \Rightarrow X \sim U(10, 30)$

$\Rightarrow F(24) \begin{cases} \frac{24-10}{30-10} = \frac{14}{20} = \frac{7}{10} \\ P(X \le 24) \sim U(10,30) = 1 - \frac{7}{10} = \frac{3}{10} \end{cases}$

Question 34 2 pts

The next four questions, including this one, concern the following setup.

The Environmental Protection Agency (EPA) collects data, such as horsepower and highway mileage, on 30 different models of small trucks, with horsepower between 280

$X = hp$

$y = mpg$

Q34)

Take Quiz Exit

Regression Statistics	
Multiple R	0.5492
R-square	0.3016
Adjusted R square	0.2766
Standard error	3.5532
Observations	30

	Coefficients	Std Error	t-stat	p-value
Intercept	31.1658	1.9332	16.1212	0.0000
Horse Power	-0.0286	0.0082	-3.4772	0.0017

What regression coefficients are statistically significant at the 5% significance level?

- ○ Intercept only
- ○ Slope only
- ✓ Both intercept and slope
- ○ Neither intercept nor slope

if statistically significant, reject H_0

2 tests

p-value

$\alpha = 0.05$ meaning strong dependence

t-stat: ① reject if $|t\text{-stat}| > t_{n-1, \alpha/2}$ *Javi suggests using p-value

② given

test 1: $|t\text{-stat}| = 3.477$

test 0: p-value $= 0.0017$

$P(|t_{n-1}| > |t\text{-stat}|)$

if p-value $< \alpha$

$\alpha = 0.05$

$0.0017 < 0.05$

$\therefore$ p-value < alpha

$\therefore$ reject H_0

$n-1, \alpha/2 = 29, \frac{2}{2}$

$= t.INV(0.975, 29)$

$\therefore t_{29, 0.025} = 2.0452$

$\Rightarrow |t\text{-stat}| > t_{29, 0.025}$

$3.4772 > 2.0452$

$\therefore$ reject H_0

below

Question 35 2 pts

Compute the margin of error of a 95% confidence interval for the slope coefficient.

0.0168

Question 36 2 pts

Compute the sample correlation between mileage and horsepower. If the information available is insufficient, enter the value 99999.

-0.5492

Question 37 2 pts

What mileage would you predict for a car with horsepower of 320? (Give a point estimate only.)

-9.152

Q36) in (simple) linear regression:

$R\text{-square} = r^2_{xy} = 0.3016$

$\therefore \sqrt{r^2_{xy}} = r_{xy} = \text{sample correlation} = -\sqrt{0.3016}$ (NEGATIVE)

* it is negative b/c the x=hp coefficient is negative!

Q37) horse power coefficient $= -0.0286$

$y = mpg = (320)(-0.0286) = -9.152$

(x) (coefficient of x)

Q35) Confidence interval: $b_1 \pm t$

$ S_{b_1} $ is "Standard Error" # MOE: $t_{n-2,\frac{\alpha}{2}} \cdot \delta_{b_1}$

Take Quiz Exit

Question 38 2 pts

It is generally believed that SAT scores are related to income. Another commonly used predictor of SAT scores is the grade point average (GPA). The worksheet "SAT" in the Excel file Final2022.xlsx contains data on 24 randomly chosen students.

Compute the sample variance of SAT. $n = 24$ (Q38)

7134.6015 = var.s(SAT)

$t_{n-2,\frac{\alpha}{2}} = t_{28,0.025}$ & $\delta_{b_1} = 0.0082$

$= 0.0082 \cdot t.inv(0.975, 28)$

Q39) two options:

Question 39 2 pts

Compute the margin of error of the 95% confidence interval for SAT.

±35.7570

① MOE: $\pm t_{n-2,\frac{\alpha}{2}} \cdot \frac{\sigma}{\sqrt{n}}$ (we have variance & n, so we have St. dev.)

↳ in previous weeks, CI used n-1 d.f. but for this, use n-2 *

Question 40 2 pts

Compute the sample correlations between each of the three pairs of the variables SAT, Income, and GPA. Then determine which of the following statements about hypothesis tests hold at the 5% significance level:

Compute the sample correlations between each of the three pairs of the variables SAT, Income, and GPA. Then determine which of the following statements about hypothesis tests hold at the 5% significance level:

- ○ We reject the null hypothesis that the correlation between SAT and Income is zero.
- ○ We reject the null hypothesis that the correlation between SAT and GPA is zero.
- ○ We reject the null hypothesis that the correlation between GPA and Income is zero.
- ✓ We reject BOTH the null hypothesis that the correlation between SAT and Income is zero AND the null hypothesis that the correlation between SAT and GPA is zero.
- ○ None of the above

$= \frac{\sqrt{\text{Sample variance from Q38}}}{\sqrt{24}} \cdot t.inv(0.975, 22)$

Q41) v. similar to Q40

Take Quiz Exit

② Data → Data Analysis → Descriptive Statistics: ✓ Summary Statistics; - use Standard Error output * t.inv(0.975, 22)

Question 41 2 pts

1mo x 2yr: |t-stat| = 95.5554 & p-value ≈ 0.00000... so REJECT

The next four questions, including this one, concern the following setup.

The worksheet interest "rates" in the Excel file Final2022.xlsx shows daily data from the beginning of the current year (2022) through October 12 on the following variables: yield rates for the 1-month treasury bill, 2-year treasury note, 10-year treasury note, 30-year treasury bond.

1mo x 10yr: REJECT

Compute the sample correlation between 1-month yield rates and the other three rates: 2-year, 10-year, and 30-year rates. Then determine which of the following statements about hypothesis tests hold at the 5% significance level:

1mo x 30yr: REJECT

- ○ We reject the null hypothesis that the correlation between the 1-month rate and the 2-year rate is zero.
- ○ We reject the null hypothesis that the correlation between the 1-month rate and the 10-year rate is zero.
- ○ We reject the null hypothesis that the correlation between the 1-month rate and the 30-year rate is zero.
- ✓ All of the above
- ○ None of the above

Q40) reject H_0 is p-value < α OR $|t\text{-stat}| > t_{n-2,\frac{\alpha}{2}}$

ft-stat = $r_{xy} \cdot \sqrt{\frac{n-2}{1-r_{xy}^2}}$ BUT if we run regression analysis, t-stat & p-values are given

so... run Data → Data Analysis → Regression: X-values: SAT; Y-values: Income, GPA, then x-values: GPA w/ Y-values: Income

Take Quiz Exit

Question 42 2 pts

Run a regression of 30-year yield rates on 2-year yield rates. That is, the response (Y) variable is the 30-year yield rate and the predictor (X) variable is the 2-year yield rate.

What is the R-square of this regression model?

0.9432

$H_0: r_{(SAT, Income)} = 0$	$H_0: r_{(SAT, GPA)} = 0$	$H_0: r_{(GPA, Income)} = 0$
p-value = 0.0204	p-value = 0.00002	p-value = 0.6649
0.0204 < 0.05	0.00002 < 0.05	0.6649 > 0.05
Reject	Reject	Accept
|t-stat| = |2.4990|	|t-stat| = |5.4014|	|t-stat| = |-0.4391|
2.4990 > 2.0739	5.4014 > 2.0739	0.4391 < 2.0739
Reject	Reject	Accept

Question 43 2 pts

Write down the estimate of the slope.

0.5305

Q43) slope estimate: coefficient of x-value

Question 44 2 pts

What regression coefficients are statistically significant at the 5% significance level?

- ○ Intercept only

Take Quiz Exit

Question 44 2 pts

What regression coefficients are statistically significant at the 5% significance level?

- Intercept only
- Slope only
- ✓ Both intercept and slope
- Neither intercept nor slope

Q44) Slope is x-value testing
Intercept is intercept testing
Do p-value or t-stat tests
Statistically-significance means
they are concluded/reject H_0

* both t-stats are huge & p-values are very small *

Question 45 2 pts

The next four questions, including this one, concern the following setup.

According to the most recent Gallup poll of 812 randomly selected adults in the US, 42% of them approve of the job Joe Biden is doing as president.

Compute the margin of error of a 0.99 confidence interval for Joe Biden's approval rating.

±0.0446

Q45) $n=812$ $\hat{p}=0.42$ 0.99CI for p

$\hat{p} \pm MOE$ $MOE = z_{\alpha/2} \cdot \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$

$= z_{0.005} \cdot \sqrt{\frac{0.42(0.58)}{812}}$

$=$norm.s.inv(0.995)*sqrt[0.42*0.58/812]

Take Quiz Exit

Question 46 2 pts

Test the null hypothesis that Joe Biden's approval rating is 45% against the two-sided alternative that it is different from 45% at the 0.01 significance level.

To that end, compute first the relevant statistic (Z-stat or t-stat, whatever applies).

-1.7184

Q46) test $H_0: p = 0.45$

$Z\text{-Stat} = \frac{\hat{p} - 0.45}{\sqrt{\frac{0.45(0.55)}{n}}} = \frac{0.42-0.45}{\sqrt{\frac{0.45(0.55)}{812}}}$

z-stat =
$\Rightarrow$ -1.7184

Question 47 2 pts

Compute the p-value of the above test.

0.0857

Take Quiz Exit

Question 47 2 pts

Compute the p-value of the above test.

0.0857

Question 48 2 pts

As a result of the above test, we reject the null hypothesis that Joe Biden's approval rating is 45% against the two-sided alternative that it is different from 45% at the 0.01 significance level.

- True
- ✓ False

p-value: pp(standard normal $|z| > |z\text{-stat}|$)

$= 2(1-$norm.s.dist$(|z\text{-stat}|, 1))$

$= 0.0857 \therefore$ do not reject/accept b/c

Quiz saved at 4:23pm Submit Quiz

accidentally skipped Q25!

p-value > 0.01

Take Quiz Exit

Question 24 2 pts

The next three questions, including this one, refer to the following setup.

Suppose X is a discrete random variable that takes values $1, 2, \ldots, 10$ with probability $1/10$ each.

Find $\mathbb{E}(X)$.

5.5

list X & ps in excel,
=sumproduct(x values, probabilities)

Question 25 2 pts

Find $\mathbf{var}(X)$.

8.25

=var.p(array of x-values)
=var.p(1:10)
$= [(1-5.5)^2 + (2-5.5)^2 + (3-5.5)^2 + (4-5.5)^2$

$$+(5-5.5)^2+(6-5.5)^2+(7-5.5)^2+(8-5.5)^2$$
$$+(9-5.5)^2+(10-5.5)^2]/10$$