Expected Vals

Discrete:
$E(x) = \Sigma(x \cdot P(x))$

Geom(p):
$E(x) = \frac{1}{p}$

Binom(n,p):
$E(x) = np$

Poisson:
$E(x) = \lambda$

Continuous:
$E(x) = \frac{a+b}{2}$

Normal:
$E(x) = \mu$

Standard Deviation

Discrete:
$\sigma = SD = \sqrt{\Sigma((x-E(x))^2 \cdot P(x))}$

Geom(p):
$\sigma = \sqrt{q/p^2}$

Binom(n,p):
$\sigma = \sqrt{npq}$

Poisson:
$\sigma = \sqrt{\lambda}$

Continuous:
$\sigma = \sqrt{\frac{(b-a)^2}{12}}$

Normal:
$SD(\hat{p}) = \sqrt{\frac{pq}{n}}$

Normal Distribution

$z\text{-score} = \frac{x - E(x)}{SD(x)}$

$SE(\hat{p}) = \sqrt{\frac{\hat{p}\hat{q}}{n}}$

$ME = (z^*)(SE(\hat{p}))$

$CI = \hat{p} \pm ME$

$\hat{p} = \frac{x}{n}$

* One Proportion Z-Test:
$z = (\hat{p} - p)/SD(\hat{p})$
$SD(\hat{p}) = \sqrt{\frac{p_0 q_0}{n}}$
default $\hat{p} = 0.5$

Calculator

- Find area between two z-scores / to the left or right of a z-score:
  2nd → DISTR → normalcdf (min z, max z)
- Find z-score given area:
  2nd → DISTR → invNorm (area)
  - to the right = invNorm (1-area)
  - to the left = invNorm (area)
- For Binomial:
  2nd → DISTR → binompdf (n, p, x)
- For Poisson:
  2nd → DISTR → poissonpdf (μ, x)
- For Hypothesis Test, Find z & p-value:
  STAT → TESTS → 1-PropZTest → enter values → CALCULATE
- For Hypothesis Test, Find Confidence Interval:
  STAT → TESTS → 1-PropZInt → enter values → CALCULATE.

Critical Values:
95% confidence: $z^* = 1.96$
90% confidence: $z^* = 1.645$
98% confidence: $z^* = 2.326$
99% confidence: $z^* = 2.576$
99.9% confidence: $z^* = 3.29$

α	1-sided z^*	2-sided z^*
.05	1.645	1.96
.01	2.33	2.576
.001	3.09	3.29

Rules:
$E(X \pm c) = E(X) \pm c$
$Var(X \pm c) = Var(X)$
$SD(X \pm c) = SD(X)$
$E(aX) = aE(X)$
$Var(aX) = a^2 Var(X)$
$SD(aX) = |a| SD(X)$

$E(X \pm Y) = E(X) \pm E(Y)$
$Var(X \pm Y) = Var(X) + Var(Y)$
$SD(X \pm Y) = \sqrt{Var(X) + Var(Y)}$

* TS: E(X) = [illegible] Find SD of [illegible]
- 130 for apples [illegible] E, 0.4 SD
- 60 for pears [illegible] SD

$Var(130A + 60P - 5) = Var(130A) + Var(60P) = 130^2 Var(A) + 60^2 Var(P) = 16900 Var(A) + 3600 Var(P) =$
$16900(.4^2) + 3600(.2^2) = 2848$

$SD(Total) = \sqrt{2848} = 53.37$

* Use Margin of Error if estimating "within __% with __% confidence".