Across
1. The balance point of a density curve, if it were made of solid material [MEAN]
5. The standardized value of an observation [ZSCORE]
7. These common density curves are symmetric and bell-shaped [NORMAL]
10. A Normal _____ plot provides a good assessment of whether a data set is approximately Normally distributed [PROBABILITY]
12. Another name for a cumulative relative frequency graph [OGIVE]
14. The standard Normal table tells us the area under the standard Normal curve to the ___ of z [LEFT]
15. A ____ curve is a smooth curve that can be used to model a distribution [DENSITY]
16. This Normal distribution has mean 0 and standard deviation 1 [STANDARD]

Down
2. The ____ rule is also known as the 68-95-99.7 rule for Normal distributions [EMPirical]
3. To standardize a value, subtract the ___ and divide by the standard deviation [MEAN]
4. The value with p percent of the observations less than it [PERCENTILE]
6. The area under any density curve is always equal to [ONE]
8. We ____ data when we change each value by adding a constant and/or multiplying by a constant. [TRANSFORM]
9. If a Normal probability plot shows a ____ pattern, the data are approximately Normal [LINEAR]
11. The point that divides the area under a density curve in half [MEDIAN]
13. This mathematician first applied Normal curves to data to errors made by astronomers and surveyors [GAUSS]
FRAPPY! Scoring Rubric

Use the following rubric to score your response. Each part receives a score of “Essentially Correct,” “Partially Correct,” or “Incorrect.” When you have scored your response, reflect on your understanding of the concepts addressed in this problem. If necessary, note what you would do differently on future questions like this to increase your score.

Intent of the Question
The goal of this question is to determine your ability to perform and interpret Normal calculations.

Solution
(a) \[ P(\text{grade} = B) = P(85 \leq \text{percent} < 94) \]
\[ = P((85-82)/5 \leq z < (94-82)/5) \]
\[ = P(0.6 \leq z < 2.4) \]
\[ = 0.9918 - 0.7257 \]
\[ = 0.2661 \]

(b) \[ P(A \text{ or } F) = P(A) + P(F) \]
\[ = P(z \geq (94-82)/5) + P(z < (65-82)/5) \]
\[ = P(z \geq 2.4) + P(z < 3.4) \]
\[ = 0.0082 + 0.0003 \]
\[ = 0.0085 \]

(c) A z-score of -0.6745 corresponds to the 25th percentile.
\[ x = \text{mean} + z(\text{std dev}) \]
\[ x = 82 + (-0.6475)(5) \]
\[ x = 78.8 \]

Scoring:
Parts (a), (b), and (c) are scored as essentially correct (E), partially correct (P), or incorrect (I).

Part (a) is essentially correct if the response (1) recognizes the need to look at grades of A and F and (2) correctly computes the tail probabilities and adds them together.
Part (a) is partially correct if the response
Considers only an A or an F and calculates the corresponding tail area correctly
Recognizes the need to look at A and F but only calculates one of the tail areas correctly
Approximates the probabilities using the Empirical rule
Computes the proportion that will “meet standards”
States the correct answer 0.0085 without supporting work

Part (b) is essentially correct if (1) the appropriate probability is illustrated using a labeled Normal curve and (2) the proportion is correctly computed.
Part (b) is partially correct if only one of the above elements is correct.

Part (c) is essentially correct if the student recognizes the situation as binomial and identifies p from part (b) and shows work to calculate the correct probability.
Part (c) is partially correct if the student recognizes the situation as binomial and identifies p, but does not compute the correct probability OR gives the correct probability but does not show work.
NOTE: If the student makes an error in part (b) and correctly uses that probability in part (c) to compute a reasonable probability, part (c) is essentially correct.

4 Complete Response  
All three parts essentially correct

3 Substantial Response  
Two parts essentially correct and one part partially correct

2 Developing Response  
Two parts essentially correct and no parts partially correct  
One part essentially correct and two parts partially correct  
Three parts partially correct

1 Minimal Response  
One part essentially correct and one part partially correct  
One part essentially correct and no parts partially correct  
No parts essentially correct and two parts partially correct

| My Score: |

| What I did well: |

| What I could improve: |

| What I should remember if I see a problem like this on the AP Exam: |