Post-Class Problems

22 - October

1.1.

1.1: 3, 9, 11

3 a. Out of 52 cards, there are 12 that are jack, queen, or king.

$P(A) = \frac{12}{52} = \boxed{\frac{3}{13}}$

b. Only red jacks are in $A \cap B$

$P(A \cap B) = \frac{2}{52} = \boxed{\frac{1}{26}}$

c. $A \cup B$ contains jack, queen, king, red 9, red 10s

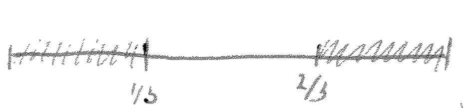
$P(A \cup B) = \frac{16}{52} = \boxed{\frac{4}{13}}$

d. $C \cup D$ contains all cards since all suits are represented

$P(C \cup D) = 1$

e. $C \cap D$ contains nothing since no card could be a member of two suits

$P(C \cap D) = 0$

9. 

If we divide anywhere in the shaded region, the longer half would be more than twice as long

$\boxed{P(\text{Shaded}) = \frac{2}{3}}$

11 a. Let $P(A_1) = n$

$P(A_2) = n$

$\vdots$

$P(A_m) = n$

Because $A_1, A_2, \dots, A_m$ are mutually exclusive and exhaustive, the sum of the probabilities equal 1

$P(A_1) + P(A_2) + \dots + P(A_m) = 1$

Thus, since $P(A_1) = n$, etc

$$\underbrace{n + n + \dots + n}_{m \text{ terms}} = 1$$

$$n \cdot m = 1$$

$$\boxed{\begin{aligned} n &= 1/m \\ P(A_i) &= 1/m \end{aligned}}$$

b. Because $A_1, A_2, \dots, A_h$ are mutually exclusive,

$P(A) = P(A_1) + P(A_2) + \dots + P(A_h)$

From part a, where $P(A_i) = 1/m$

$$P(A) = \underbrace{\frac{1}{m} + \frac{1}{m} + \dots + \frac{1}{m}}_{h \text{ terms}},$$

$$\boxed{P(A) = \frac{h}{m}}$$