

7. [8 points] Suppose  $F$  is a nonnegative function defined for all real numbers  $x$ . Below are properties of  $F$ . Circle **all** that apply to  $F$  based on the fact it has this property.

a. [2 points]  $\int_{-\infty}^{\infty} F(x)dx = 1$ .

- (A)  $F$  could be a PDF.  
(B)  $F$  could be a CDF.  
(C)  $F$  is definitely not a PDF or a CDF.

b. [2 points]  $\lim_{x \rightarrow \infty} F(x) = 1$  and  $F(2) < F(1)$ .

- (A)  $F$  could be a PDF.  
(B)  $F$  could be a CDF.  
(C)  $F$  is definitely not a PDF or a CDF.

c. [2 points]  $F'(x) > 0$  for  $x \geq 0$ .

- (A)  $F$  could be a PDF.  
(B)  $F$  could be a CDF.  
(C)  $F$  is definitely not a PDF or a CDF.

d. [2 points]  $F(7) = 2$ .

- (A)  $F$  could be a PDF.  
(B)  $F$  could be a CDF.  
(C)  $F$  is definitely not a PDF or a CDF.

8. [9 points] The parts of this problem are unrelated.

a. [4 points] Let  $\sum_{n=1}^{\infty} a_n$  be a geometric series with  $a_3 = 54$  and  $a_6 = -2$ . Write a general formula for  $a_n$ :

b. [5 points] Let  $b_n = \frac{n}{n+1}$  and  $s_n = \sum_{i=1}^n b_i$ . Circle all statements which are true.

- (A) The sequence  $b_n$  is bounded.                      (D) The sequence  $s_n$  is bounded.  
(B) The sequence  $b_n$  is monotone.                      (E) The sequence  $s_n$  is monotone.  
(C)  $\lim_{n \rightarrow \infty} b_n$  exists.                                      (F)  $\lim_{n \rightarrow \infty} s_n$  exists.