MS 120 PDF Extra Problems

1. (a) Is the following a pdf (probability density function)?

$$f(x) = x + 1; x \in [-1, 1]$$

   (b) If $f(x)$ in (a) is not a pdf, can we modify it to make it into one?

   (c) If either (a) or (b) is yes, find:

   i. $\Pr(-0.5 \leq X \leq 0.5) =$
   ii. $\Pr(-1 \leq X \leq 0.75) =$
   iii. $\Pr(0.75 \leq X \leq 2) =$

2. (a) Is the following a pdf (probability density function)?

$$f(x) = 3x^2; x \in [0, 4]$$

   (b) If $f(x)$ in (a) is not a pdf, can we modify it to make it into one?

   (c) If either (a) or (b) is yes, find:

   i. $\Pr(0 \leq X \leq 3) =$
   ii. $\Pr(3 \leq X \leq 4) =$
   iii. $\Pr(0.25 \leq X \leq 2.7) =$

3. (a) Is the following a pdf (probability density function)?

$$f(x) = \begin{cases} 2x & , 0 \leq x \leq 3 \\ -6x + 24 & , 3 < x \leq 4 \end{cases}; x \in [0, 4]$$

   (b) If $f(x)$ in (a) is not a pdf, can we modify it to make it into one?

   (c) If either (a) or (b) is yes, find:

   i. $\Pr(0 \leq X \leq 3) =$
   ii. $\Pr(3 \leq X \leq 4) =$
   iii. $\Pr(2.5 \leq X \leq 3.5) =$

4. (a) Is the following a pdf (probability density function)?

$$f(x) = -x + 5; x \in [0, 5]$$

   (b) If $f(x)$ in (a) is not a pdf, can we modify it to make it into one?

   (c) If either (a) or (b) is yes, find:

   i. $\Pr(0 \leq X \leq 3) =$
   ii. $\Pr(3 \leq X \leq 5) =$
   iii. $\Pr(1 \leq X \leq 2) =$

5. (a) Is the following a pdf (probability density function)?

$$f(x) = x^3; x \in [-1, 3]$$

   (b) If $f(x)$ in (a) is not a pdf, can we modify it to make it into one?

   (c) If either (a) or (b) is yes, find:

   i. $\Pr(-1 \leq X \leq 2) =$
   ii. $\Pr(2 \leq X \leq 3) =$
   iii. $\Pr(-0.5 \leq X \leq 1.25) =$