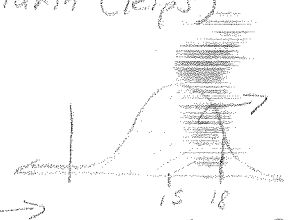
33 Let X be force acting on a column (kips)

$X \sim N(\mu_x = 15,\ \sigma_x = 1.25)$

a. $P(X \le 18) = \int_{-\infty}^{18} f(x)\,dx \Rightarrow$ 

$= \underline{0.991802}$ ANS

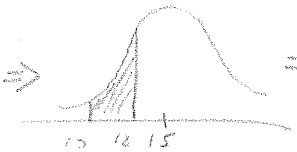
OR $P(0 \le X \le 18) = \int_{0}^{18} f(x)\,dx \Rightarrow$

$= \underline{0.991802}$

* Difference is negligible!

★ Note: There is a Mathematica bug in the formulation of the normal distribution PDF. Because there is no closed form solution to the CDF of any Normal distribution, the app is using numerical approximations. This sometimes results in erroneous numbers. This is a good example of the necessity to check validity of a PDF using the 1st 3 properties of continuous distributions.

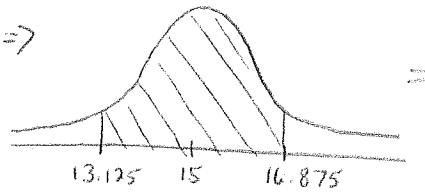
★ Note: Devore solution manual is wrong for part a. (correct answer is 0.9918 (as shown).

b. $P(10 \le X \le 12) = \int_{10}^{12} f(x)\,dx \Rightarrow$ 

$\Rightarrow = \underline{0.00816586}$ ANS

c. $P(15 - 1.5\sigma \le X \le 15 + 1.5\sigma) \Rightarrow$

$1.5\sigma = (1.5)(1.25) = 1.875$



$\Rightarrow = \underline{0.8664}$ ANS

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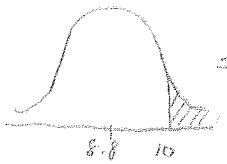
35 Let X be diameter at breast height (in)

$X \sim N(\mu_x = 8.8,\ \sigma_x = 2.8)$

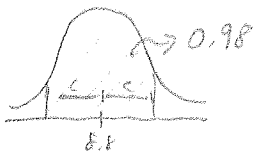
a. $P(X \ge 10) = P(X > 10) = \int_{10}^{\infty} f(x)\,dx \Rightarrow$ 

$\Rightarrow = \underline{0.334118}$ ANS

b. $P(X > 20) = \int_{20}^{\infty} f(x)\,dx = \underline{0.0000316712}$ ANS

c. $P(5 \le X \le 10) = \int_{5}^{10} f(x)\,dx = \underline{0.578514517}$ ANS

d. $P(8.8 - c \le X \le 8.8 + c) = 0.98$



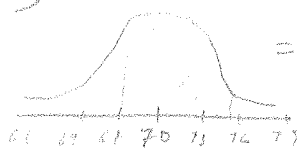
$\int_{8.8}^{8.8+c} f(x)\,dx = 0.49$

solve for "c"

$c = \underline{6.51377}$ ANS

(46) Let X be Rockwell hardness of alloy

$X \sim N(\mu_x = 70,\ \sigma_x = 3)$

a. $P(67 \le x \le 75) = \int_{67}^{75} f(x)\,dx \Rightarrow$  $= \underline{0.790554}$ Ans

b. $P(70-c \le x \le 70+c) = \int_{70-c}^{70+c} f(x)\,dx = 0.95$

By symmetry $\int_{70}^{70+c} f(x)\,dx = 0.475 \Rightarrow c = \underline{5.87989}$ Ans