Some answers to a few of our problems...

2.104: The probability that a randomly selected labor dispute (from this pool of disputes) is resolved without a strike is
$(0.45)(0.6) + (0.7)(0.15) + (0.4)(0.25) = .475$

2.105: The probability that a (randomly selected) labor dispute is about wages if it is resolved without a strike is
$P(\text{It's about wages} \mid \text{there's no strike}) = \frac{P(\text{it's about wages AND there's no strike})}{P(\text{there's no strike})}$

$$= \frac{P(\text{there's no strike} \mid \text{it's about wages}) \cdot P(\text{it's about wages})}{P(\text{there's no strike})}$$

$$= \frac{0.6 \cdot 0.45}{0.475} = 0.5684$$

2.106a: I assume here that the 0.82 and 0.03 given are the conditional probabilities of diagnosis given that the accident was or wasn't due to faulty brakes. I can't see another interpretation that makes sense.

Then the problem is like 2.104 and 2.105 above.

That said, then $P(\text{diagnosis of faulty brakes}) = .0616$,and ...

2.106b: ...$P(\text{accident was caused by faulty brakes} \mid \text{the diagnosis was faulty brakes}) = .5325$

3.16b: $P(3 < X < 5) = \frac{2}{5}$.

3.20: $P(Y < 3.2) = \int_{-\infty}^{3.2} f(y)\,dy$...

$$\begin{aligned} &= \int_{-\infty}^{2} f(y)\,dy + \int_{2}^{3.2} f(y)\,dy \\ &= \int_{-\infty}^{2} 0dy + \int_{2}^{3.2} \frac{1}{8}(y+1)\,dy \\ &= \frac{1}{16}(y+1)^2\Big|_{2}^{3.2} = 0.54 \text{ (exactly).} \end{aligned}$$

Note there are other ways to form an antiderivative here, but this one works.

$P(2.9 < Y < 3.2) = \int_{2.9}^{3.2} f(y)\,dy \approx 0.1519$.

3.94a: I need $P(X \leq 18)$ (Note X is already in units of thousands of km)

$$\begin{aligned} P(X \leq 18) &= \int_{-\infty}^{18} f(x)\,dx = \int_{-\infty}^{0} f(x)\,dx + \int_{0}^{18} f(x)\,dx \\ &= \int_{-\infty}^{0} 0dx + \int_{0}^{18} \frac{1}{30} e^{-x/30} dx \\ &= -e^{-x/30}\Big|_{0}^{18} = -e^{-3/5} - (-1) \approx .4512 \end{aligned}$$

Note: Feel free to use Wolfram Alpha or a calculator to compute the integrals; For example, on a TI-84 (the most common calculator in our class), the command...

fnInt((1/30)e^(-X/30),X,0,18)

...will give 0.4511883639, which is correct to 10 decimal places.

3.94b: We need $\int_{27}^{36} f(x)\,dx = \int_{27}^{36} \frac{1}{30} e^{-x/30} dx = -e^{-\frac{6}{5}} + e^{-\frac{9}{10}} \approx 0.1054$

3.94b: We need $\int_{48}^{\infty} f(x)\,dx$, which we can do as an improper integral, but we can also note that

$$\begin{aligned} 1 &= \int_{-\infty}^{\infty} f(x)\,dx \\ &= \int_{-\infty}^{0} f(x)\,dx + \int_{0}^{48} f(x)\,dx + \int_{48}^{\infty} f(x)\,dx, \end{aligned}$$

and that of the last three, the first is trivial because the integrand is zero, and the second is not improper - in fact, the second one can be done on your calculator...

3.96: Note the function given is F, not f, i.e. a cdf, not a pdf. This makes our work massively easier, which is partly why we are interested in using cdfs rather than pdfs.

Doing the problems in a funny order, we have:

3.96b: $P(X < 8) = P(X \leq 8) = F(8) \approx 0.6094$.

3.96a: $P(X > 10) = 1 - P(X \leq 10) = 1 - F(10) = 0.25$.

3.96c: $P(12 \leq X \leq 15) = P(X \leq 15) - P(X < 12)$ (why?!) $= F(15) - F(12) = \frac{1}{16}$.