Day 2 (Again, less important questions are marked with ***.)

(1) Rebecca's Problems: 9,10,11, 12 (A only), 13 (A only), 15 (a only)
(2) Day 2 problems on first day sheet.
(3) Find the following quantities for $u = (2, 4, 6)$, $v = (1, 2, 3)$, $w = (0, 1, 0)$
   (a) $\sqrt{v \cdot v}$
   (b) $\sqrt{u \cdot u}$
   (c) $u \cdot v$
   (d) $w \cdot u$
   (e) $v \cdot u$
(4) Find the maximum of $e^{\alpha x}$ on $[20, 50]$ for $\alpha > 0$. What about for $\alpha < 0$?
(5) Find the maximum of $\alpha x^2 + x$ for $\alpha < -1$ on $[0, 10]$.
(6) ***If you're feeling confident (really, it shouldn't be so hard with your notes!). Define $F(x)$ by

$$F(x) \quad = \quad \int_0^{x^2} \frac{1}{2} \ln(y) dy$$

   Find the maximum of F on $[1, 100]$ using this definition. Find $F'(x)$ and use it first to see if F is concave, then use it to find a formula for $F(x)$. What is $(xF'(x))'$?
(7) Find the set of all critical points, $\{x : \ f'(x) = 0\}$, of the following functions (for d-e you should see a trick!):
   (a) $f(x) = \alpha$
   (b) $g(x) = e^{\beta x}$
   (c) $h(x) = ax^3 + bx^2 + cx + d$
   (d) ***$f(x) \cdot g(x)$
   (e) ***$f(x) \cdot h(x)$