Solutions to practice midterm.

(These are final solutions only, on the exam you should show full working.)

1. a) $x \arctan x - \frac{1}{2} \ln(1 + x^2) + C$,
b) $2 \arctan x - \frac{1}{2} \ln(1 + x^2) - \ln(x + 2) + C$
c) $\frac{x}{81\sqrt{9+x^2}} - \frac{x^3}{243(9+x^2)^{3/2}} + C$.

2. $\pi/3$.

3. $1/3$.

4. a) Diverges, b) Converges to $\pi/2 - \arctan(e)$.

5. Converges to $0$ (use squeeze theorem)

6. a) Diverge (limit comparison), b) Converge (integral test).

7. a) CC (comparison + alt.), b) D (divergence test).

8. ignore

9. Diverges ( $\lim a_n = 0$ so $\lim 1/a_n \neq 0$).

10. 5