AMAT 219 PRACTICE SHEET #2

Determine each of the following integrals

1. $\int \frac{x-3}{x^2-6x+8}\,dx$
2. $\int \frac{2x-7}{x-4}\,dx$
3. $\int \frac{x^4-x^3+11x^2-9x+18}{2x^2+18}\,dx$
4. $\int \frac{20}{x^3-3x^2-4x}\,dx$
5. $\int \frac{1}{x^4-x^2}\,dx$
6. $\int \frac{e^{-x}+2}{e^{-2x}+e^{-x}-30}\,dx$ Hint: First use the substitution $t=e^{-x}$.
7. $\int \frac{2x-1}{x(x^2+4)}\,dx$
8. $\int \frac{5-x}{x^3-2x^2+5x}\,dx$
9. $\int \frac{1}{(x^2+1)(x^2+4)}\,dx$
10. $\int \frac{4x}{(x-1)(x+3)(x-2)}\,dx$
11. $\int \frac{36}{(x-1)^2(x^2-4)}\,dx$
12. $\int \frac{6x+9}{x^3-27}\,dx$ Note : $a^3-b^3=(a-b)(a^2+ab+b^2)$
13. $\int \frac{(\sin(x)-2)\cos(x)}{\sin^2(x)+4\sin(x)-12}\,dx$ Hint: First use the substitution $t=\sin(x)$.
14. $\int \frac{2x^2-x}{x^3-x^2+x}\,dx$ Hint: Simplify first!
15. $\int \frac{x+3}{(x^2-1)(x+1)}\,dx$
16. $\int \frac{x}{x^3+10x^2+25x}\,dx$
17. $\int \frac{e^x}{e^{2x}-4}dx$ Hint : make a suitable substitution first!

18. $\int \frac{4s-1}{s^2(s^2+9)}\, ds$

19. $\int \frac{1}{s^3-3s^2+3s-1}\, ds$ Hint: factor denominator by grouping.

20. $\int \frac{d}{dx}\{\frac{2x^3-2x+7}{x^4-64}\}\, dx.$

ANSWERS TO AMAT 219 PRACTICE SHEET # 2

1. $\frac{1}{2}\ln|\, x-4\,| + \frac{1}{2}\ln|\, x-2\,| + C$ OR: $\frac{1}{2}\ln|\, x^2-6x+8\,| + C$

2. $2x + \ln|\, x-4\,| + C$

3. $\frac{1}{6}x^3 - \frac{1}{4}x^2 + x + C$

4. $-5\ln|\, x\,| + \ln|\, x-4\,| + 4\ln|\, x+1\,| + C$

5. $\frac{1}{2}\ln|\, x-1\,| - \frac{1}{2}\ln|\, x+1\,| + \frac{1}{x} + C$

6. $-\frac{1}{15}x - \frac{7}{55}\ln|\, e^{-x}-5\,| + \frac{2}{33}\ln(e^{-x}+6) + C$

7. $-\frac{1}{4}\ln|\, x\,| + \arctan(\frac{x}{2}) + \frac{1}{8}\ln(x^2+4) + C$

8. $\ln|\, x\,| - \frac{1}{2}\ln|\, x^2-2x+5\,| + C$

9. $\frac{1}{3}\{\arctan(x) - \frac{1}{2}\arctan(\frac{x}{2})\} + C$

10. $-\ln|\, x-1\,| - \frac{3}{5}\ln|\, x+3\,| + \frac{8}{5}\ln|\, x-2\,| + C$

11. $-8\ln|\, x-1\,| + \frac{12}{x-1} + 9\ln|\, x-2\,| - \ln|\, x+2\,| + C$

12. $\ln|\, x-3\,| - \frac{1}{2}\ln|\, x^2+3x+9\,| + \frac{1}{\sqrt{3}}\arctan(\frac{2x+3}{3\sqrt{3}}) + C$

13. $\ln|\, \sin(x)+6\,| + C$

14. $\ln|\, x^2-x+1\,| + C$

15. $\ln|\, x-1\,| - \ln|\, x+1\,| + \frac{1}{x+1} + C$

16. $-\frac{1}{x+5} + C$

17. $\frac{1}{4}\ln\left|\frac{e^x-2}{e^x+2}\right|+C$

18. $\frac{1}{9}\{4\ln|\ s\ |+\frac{1}{s}+\frac{1}{3}\arctan(\frac{s}{3})-2\ln(\ s^2+9\ )\}+C$

19. $-\frac{1}{2}(\ s-1\ )^{-2}+C$

20. $\frac{2x^3-2x+7}{x^4-64}+C$