MATH 172 PROBLEM SET 1

Evaluate the integrals given below:

(A)

1. $\int \sqrt{x^4}\,dx$
2. $\int \left(2x^3 - 5x^4 + 2\right)dx$
3. $\int \left(4x^4 - 2x^2 + 1\right)dx$
4. $\int (x+3)(2x-3)dx$
5. $\int (x^2 + ax)^2\, x dx$ (*a* is a constant)
6. $\int (2x^2 - \frac{1}{x^3})dx$
7. $\int (\frac{1}{4}x^4 - \frac{4}{x^4})dx$
8. $\int \frac{3x^2 - 2x + 1}{6x^5}dx$
9. $\int (\frac{3}{\sqrt{x}} - \frac{x\sqrt{x}}{4})dx$
10. $\int (\frac{1}{x^2} + \frac{4}{4\sqrt{x}} + 2)dx$
11. $\int (\frac{1}{\sqrt[4]{x}})dx$
12. $\int (x^2 + \frac{1}{\sqrt[3]{x}})dx$
13. $\int (3x^5 + \frac{3}{\sqrt{x}} - \frac{x\sqrt{x}}{4})dx$
14. $\int 2^x 3^{2x} 5^{3x}\,dx$
15. $\int \left(\sqrt{x} + \frac{1}{\sqrt[3]{x}}\right)dx$

(B)

1. $\int \sqrt{2x+3}dx$
2. $\int \frac{1}{3x-7}dx$
3. $\int \frac{dx}{(2x-7)^2}$
4. $\int \frac{1}{1-x}dx$
5. $\int \frac{1}{5-2x}dx$
6. $\int \frac{xdx}{\sqrt{1-4x^2}}$
7. $\int \frac{xdx}{(3x^2+4)^3}$
8. $\int \frac{x^2 dx}{\sqrt{x^3+5}}$
9. $\int e^{3x}dx$
10. $\int xe^{-x^2}dx$
11. $\int 10^{2x}dx$
12. $\int \sqrt{x^2+1}\,xdx$
13. $\int \frac{x}{\sqrt{2x^2+3}}dx$
14. $\int \frac{\ln^2 x}{x}dx$
15. $\int \frac{x}{x^2+1}dx$
16. $\int \frac{1}{x\ln x}dx$
17. $\int 2x(x^2+1)^4 dx$
18. $\int (x^3+1)^2 3x^2 dx$
19. $\int 6x\sqrt{1+2x^2}dx$
20. $\int \frac{dx}{2x-3}$

(C)

1. Find the following indefinite integrals.

$a)\int \frac{dx}{\sqrt[4]{x^5}}$, $b)\int x^2(x^4+1)dx$, $c)\int \frac{8}{(2x-1)^3}dx$, $d)\int (2x^3+x)(x^4+x^2)dx$, $e)\int x\sqrt{x}\,dx$,

$g)\int \frac{e^{-x}}{1+2e^{-x}}dx$, $h)\int e^{\ln(x+1)}dx$, $i)\int (x^7 + \frac{1}{x^3} + \frac{1}{x} + e^x)dx$, $j)\int 2x\sqrt{3-2x^2}dx$,

$k)\int \frac{1}{x^2}\sqrt{\frac{1}{x}+1}\,dx$, $l)\int \frac{\ln(x+1)}{x+1}dx$, $m)\int xe^{x^2}dx$, $n)\int \frac{2t^2}{3+2t^3}dt$ $o)\int \frac{x+1}{x^2+2x}\ln(x^2+2x)dx$

2. Find $y(x)$, subject to the given conditions

a) $y' = 0.5e^x - 2x$ and $y(0) = 0.5$, b) $x > 0$, $y(1) = 0$, $y'(1) = \frac{1}{4}$, $y''(x) = x^{-2} + x^3 + 2$,

3. Find demand function if the marginal revenue function is given as,

$$\frac{dr}{dq} = \frac{150}{(q+1)^2}$$ (answer : p = $-\frac{150}{q(q+1)} + \frac{150}{q}$)

4. Marginal cost function is given, and fixed cost is 250$/per week. Find the cost function

$$\frac{dc}{dq} = 10 - \frac{100}{q+e}$$