

**REVISION FOR UNIT 1 ASSESSMENT****PRACTICE ASSESSMENT 1****Outcome 1**

1. Expand  $(x + y)^4$ .

2. Express  $\frac{4x - 5}{(x + 1)(x - 2)}$  in partial fractions.

**Outcome 2**

3. Differentiate each of the following functions with respect to  $x$ :

(a)  $f(x) = x^4 \ln x$

(b)  $f(x) = \frac{x + 4}{2x + 1}$

(c)  $f(x) = e^{\cos x}$

**Outcome 3**

4. Find: (a)  $\int \frac{2x}{x^2 + 1} dx$  (b)  $\int e^{4x} dx$

5. Make use of the substitution  $u = \sin x$  to find  $\int \sin^4 x \cos x dx$ .

**Outcome 4**

6.  $f(x) = \frac{x^2 + 2x + 5}{x + 1}$ ,  $x \neq -1$ .

- (a) Write down the equation of the vertical asymptote on the graph of  $y = f(x)$ .  
 (b) Show that there is a non-vertical asymptote and find its equation.  
 (c) Sketch the graph of  $y = f(x)$ , showing clearly the points of intersection with the coordinate axes and the stationary points. Justify the nature of each stationary point.

**Outcome 5**

7. Use Gaussian elimination to solve the following system of equations:

$$\begin{array}{rrcr} x & + & y & & = & 4 \\ 2y & + & z & = & 1 \\ 2x & + & y & - & z & = & 9 \end{array}$$

**PRACTICE ASSESSMENT 2****Outcome 1**

1. Expand  $(a + b)^5$ .

2. Express  $\frac{3x}{(x + 2)(x - 4)}$  in partial fractions.

**Outcome 2**

3. Differentiate each of the following functions with respect to  $x$ :

(a)  $f(x) = x^3 e^x$

(b)  $f(x) = \frac{2x + 1}{3x + 1}$

(c)  $f(x) = \ln(x^2 + 1)$

**Outcome 3**

4. Find: (a)  $\int \frac{3x^2}{x^3 - 8} dx$  (b)  $\int e^{3x} dx$

5. Make use of the substitution  $u = \cos x$  to find  $\int \sin x \cos^3 x dx$ .

**Outcome 4**

6.  $f(x) = \frac{x^2 + 4x + 4}{x - 1}$ ,  $x \neq 1$ .

- (a) Write down the equation of the vertical asymptote on the graph of  $y = f(x)$ .  
 (b) Show that there is a non-vertical asymptote and find its equation.  
 (c) Sketch the graph of  $y = f(x)$ , showing clearly the points of intersection with the coordinate axes and the stationary points. Justify the nature of each stationary point.

**Outcome 5**

7. Use Gaussian elimination to solve the following system of equations:

$$\begin{array}{rrcr} x & + & 2y & & = & 5 \\ & & y & - & z & = & 3 \\ 3x & + & 2y & + & z & = & 6 \end{array}$$

### PRACTICE ASSESSMENT 3

#### Outcome 1

1. Expand  $(p + q)^6$ .
2. Express  $\frac{3x - 1}{(x + 5)(x - 3)}$  in partial fractions.

#### Outcome 2

3. Differentiate each of the following functions with respect to  $x$ :

- (a)  $f(x) = 2x^3 \sin x$
- (b)  $f(x) = \frac{3x + 2}{4x + 1}$
- (c)  $f(x) = e^{3x^2}$

#### Outcome 3

4. Find: (a)  $\int \frac{\cos x}{1 + \sin x} dx$  (b)  $\int e^{-2x} dx$

5. Make use of the substitution  $u = x^2 + 1$  to find  $\int 2x(x^2 + 1)^3 dx$ .

#### Outcome 4

6.  $f(x) = \frac{x^2 + 3x + 6}{x - 2}$ ,  $x \neq 2$ .

- (a) Write down the equation of the vertical asymptote on the graph of  $y = f(x)$ .
- (b) Show that there is a non-vertical asymptote and find its equation.
- (c) Sketch the graph of  $y = f(x)$ , showing clearly the points of intersection with the coordinate axes and the stationary points. Justify the nature of each stationary point.

#### Outcome 5

7. Use Gaussian elimination to solve the following system of equations:

$$\begin{array}{rcl} x + 2y + z & = & 5 \\ 2x + y - 2z & = & 1 \\ x & - & z = 2 \end{array}$$

### PRACTICE ASSESSMENT 4

#### Outcome 1

1. Expand  $(m + n)^5$ .
2. Express  $\frac{2x + 12}{(x + 1)(x + 3)}$  in partial fractions.

#### Outcome 2

3. Differentiate each of the following functions with respect to  $x$ :

- (a)  $f(x) = 3x^2 \ln x$
- (b)  $f(x) = \frac{2x - 1}{3x + 1}$
- (c)  $f(x) = \exp(\tan x)$  [Note:  $\exp(\tan x) = e^{\tan x}$ ]

#### Outcome 3

4. Find: (a)  $\int \frac{e^x}{e^x + 1} dx$  (b)  $\int \frac{1}{2x + 1} dx$

5. Make use of the substitution  $u = \sin x$  to find  $\int \sin^5 x \cos x dx$ .

#### Outcome 4

6.  $f(x) = \frac{x^2 + 2x + 1}{x + 3}$ ,  $x \neq -3$ .

- (a) Write down the equation of the vertical asymptote on the graph of  $y = f(x)$ .
- (b) Show that there is a non-vertical asymptote and find its equation.
- (c) Sketch the graph of  $y = f(x)$ , showing clearly the points of intersection with the coordinate axes and the stationary points. Justify the nature of each stationary point.

#### Outcome 5

7. Use Gaussian elimination to solve the following system of equations:

$$\begin{array}{rcl} x + 3y & = & 3 \\ 4y - 2z & = & 2 \\ 2x + y + 2z & = & 5 \end{array}$$

# PRACTICE ASSESSMENT 5

## Outcome 1

- Expand  $(c+d)^4$ .
- Express  $\frac{2x+11}{(x-2)(x+3)}$  in partial fractions.

## Outcome 2

- Differentiate each of the following functions with respect to  $x$ :

- $f(x) = e^x \cos x$
- $f(x) = \frac{2x}{x^2+1}$
- $f(x) = \ln(\sin x)$

## Outcome 3

- Find: (a)  $\int \frac{4x}{2x^2-1} dx$  (b)  $\int e^{-x} dx$

- Make use of the substitution  $u = \cos x$  to find  $\int \sin x \cos^2 x dx$ .

## Outcome 4

- $f(x) = \frac{x^2+2x+8}{x-2}$ ,  $x \neq 2$ .

- Write down the equation of the vertical asymptote on the graph of  $y = f(x)$ .
- Show that there is a non-vertical asymptote and find its equation.
- Sketch the graph of  $y = f(x)$ , showing clearly the points of intersection with the coordinate axes and the stationary points. Justify the nature of each stationary point.

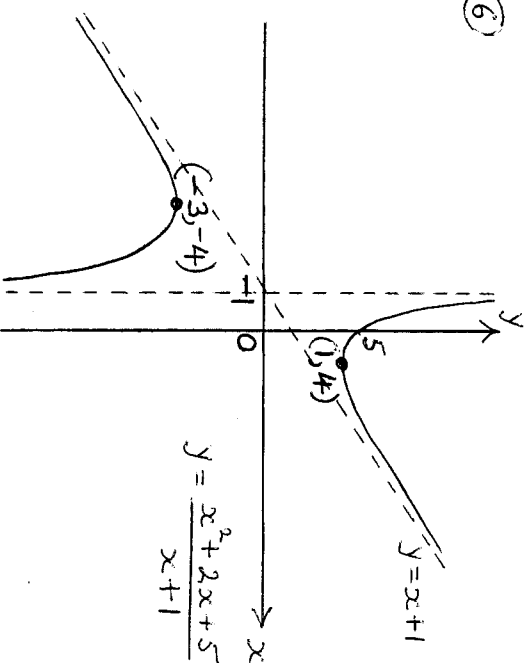
## Outcome 5

- Use Gaussian elimination to solve the following system of equations:

$$\begin{array}{rcl} x + y & = & 3 \\ 2x & + & 3z = 8 \\ x - y + 2z & = & 1 \end{array}$$

# ANSWERS TO PRACTICE ASSESSMENT 1

- $x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$
- $\frac{3}{x+1} + \frac{1}{x-2}$
- (a)  $x^3(1+4\ln x)$  (b)  $-\frac{7}{(2x+1)^2}$   
(c)  $-\sin x \cdot e^{\cos x}$
- (a)  $\ln(x^2+1) + C$  (b)  $\frac{1}{4}e^{4x} + C$
- $\frac{1}{5}\sin^5 x + C$
- 



- $x = 2$ ,  $y = 2$ ,  $z = -3$

## ANSWERS TO PRACTICE ASSESSMENT 2

①  $a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5$

②  $\frac{1}{x+2} + \frac{2}{x-4}$

③ (a)  $2x^2(x+3)e^x$

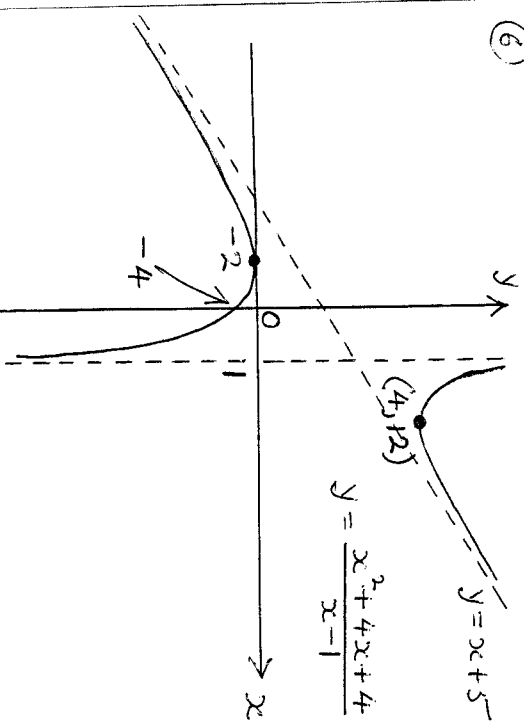
(b)  $-\frac{1}{(3x+1)^2}$

(c)  $\frac{2x}{x^2+1}$

④ (a)  $\ln(x^3-8) + C$  (b)  $\frac{1}{3}e^{3x} + C$

⑤  $-\frac{1}{4}\cot^4 x + C$

⑥



⑦  $x = 1, y = 2, z = -1$

## ANSWERS TO PRACTICE ASSESSMENT 3

①  $p^6 + 6p^5q + 15p^4q^2 + 20p^3q^3 + 15p^2q^4 + 6pq^5 + q^6$

②  $\frac{2}{x+5} + \frac{1}{x-3}$

③ (a)  $2x^2(x \cos x + 3 \sin x)$

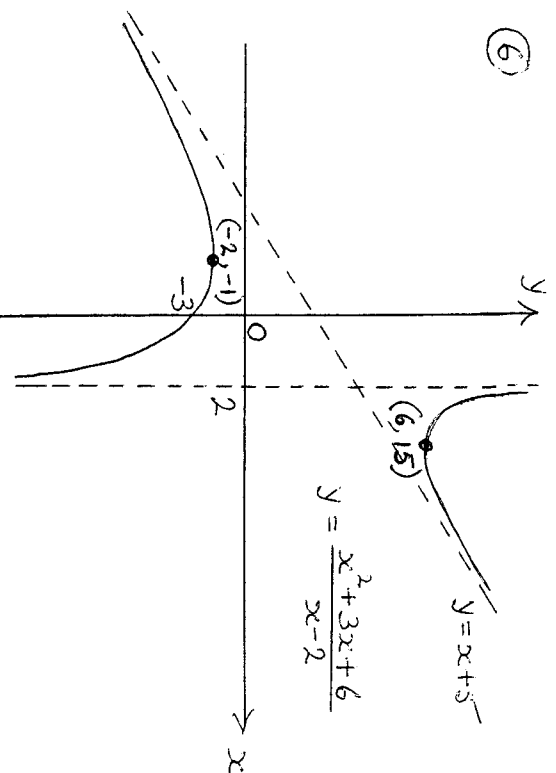
(b)  $-\frac{5}{(4x+1)^2}$

(c)  $4x e^{2x^2}$

④ (a)  $\ln(1 + \sin x) + C$  (b)  $-\frac{1}{2}e^{-2x} + C$

⑤  $\frac{1}{4}(x^2+1)^4 + C$

⑥



⑦  $x = 6.5, y = -3, z = 4.5$

# ANSWERS TO PRACTICE ASSESSMENT 4

①  $m^5 + 5m^4n + 10m^3n^2 + 10m^2n^3 + 5mn^4 + n^5$

②  $\frac{5}{x+1} - \frac{2}{x+3}$

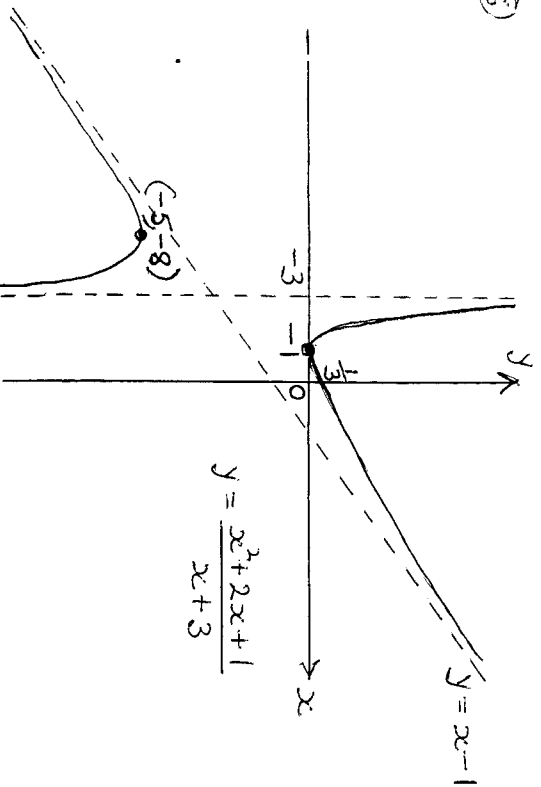
③ (a)  $3x(1+2\ln x)$  (b)  $\frac{5}{(3x+1)^2}$

(c)  $\sec^2 x \cdot \exp(\tan x)$   
[or  $\sec^2 x \cdot e^{\tan x}$ ]

④ (a)  $\ln(e^x + 1) + C$  (b)  $\frac{1}{2} \ln(2x+1) + C$

⑤  $\frac{1}{6} \sin^6 x + C$

⑥



⑦  $x = 6, y = -1, z = -3$

# ANSWERS TO PRACTICE ASSESSMENT 5

①  $c^4 + 4cd^3 + 6c^2d^2 + 4cd^3 + d^4$

②  $\frac{3}{x-2} - \frac{1}{x+3}$

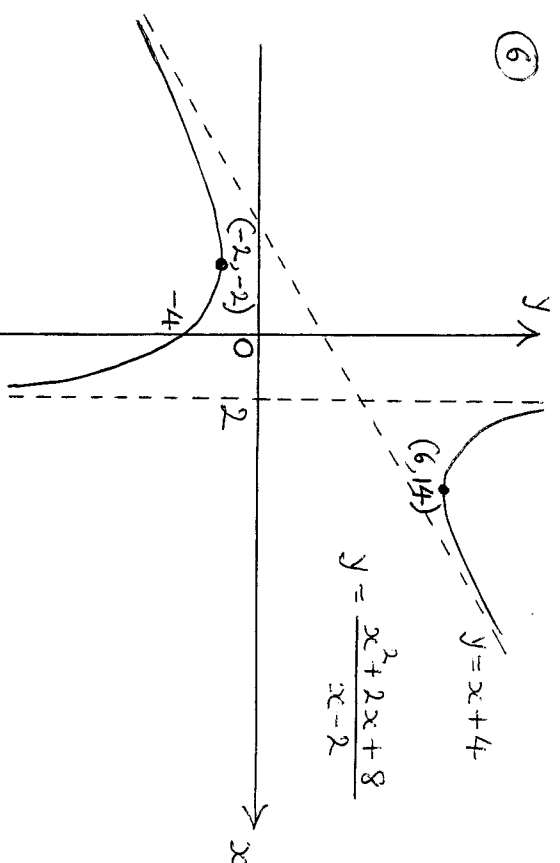
③ (a)  $e^x(\cos x - \sin x)$  (b)  $\frac{2(1-x)(1+x)}{(x^2+1)^2}$

(c)  $\cot x$  [or  $\frac{\cos x}{\sin x}$ ]

④ (a)  $\ln(2x^2 - 1) + C$  (b)  $-e^{-x} + C$

⑤  $-\frac{1}{3} \cos^3 x + C$

⑥



⑦  $x = -2, y = 5, z = 4$

